ENCYCLOPAEDIA;
OR, A
DICTIONARY
OF
ARTS, SCIENCES,
AND
MISCELLANEOUS LITERATURE;
Constructed on a Plan,
BY WHICH
THE DIFFERENT SCIENCES AND ARTS
Are digested into the Form of Distinct
TREATISES OR SYSTEMS,
COMPREHENDING
THE HISTORY, THEORY, and PRACTICE, of each,
According to the Latest Discoveries and Improvements;
AND FULL EXPLANATIONS GIVEN OF THE
VARIOUS DETACHED PARTS OF KNOWLEDGE,
WHETHER RELATING TO
NATURAL and ARTIFICIAL Objects, or to Matters ECCLESIASTICAL,
CIVIL, MILITARY, COMMERCIAL, &c.
Including ELUCIDATIONS of the most important Topics relative to RELIGION, MORALS, MANNERS,
and the OECONOMY of LIFE:
TOGETHER WITH
A DESCRIPTION of all the Countries, Cities, principal Mountains, Seas, Rivers, &c.
throughout the WORLD;
A General History, Ancient and Modern, of the different Empires, Kingdoms, and States;
AND
An Account of the Lives of the most Eminent Persons in every Nation,
from the earliest ages down to the present times.

Compiled from the writings of the best Authors, in several languages; the most approved Dictionaries, as well of general science as of its particular branches; the Transactions, Journals, and Memoirs, of various Learned Societies, the MS. Lectures of Eminent Professors on different sciences; and a variety of Original Materials, furnished by an Extensive Correspondence.

THE FIRST AMERICAN EDITION, IN EIGHTEEN VOLUMES, GREATLY IMPROVED.
ILLUSTRATED WITH FIVE HUNDRED AND FORTY-TWO COPPERPLATES.

VOL. I.  A—ANG

P H I L A D E L P H I A:
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TO THE

PATRONS of the Arts and Sciences; the promoters of useful and ornamental Literature in the United States of America, whose communications have enriched this extensive and important work; and by whose generous encouragement this arduous enterprise has been brought to its completion;

The American Edition of the

ENCYCLOPÆDIA

is Dedicated,

with the most grateful respect,

by their much obliged servant,

THOMAS DOBSON.

PHILADELPHIA, 1798.
THE utility of science, and the delight which it affords to the human mind, are acknowledged by every man who is not immersed in the grōste ignorant. It is to the philosopher that the husbandman, the architect, the carpenter, and the seaman, &c. are indebted for the principles of those arts, by which they furnish us with most of the accommodations, and with all the elegances, of civilized life; whilst the pleasure experienced in the very progress of philosophical research is such, as both reason and revelation intimate, not obscurely, will constitute part of our happiness in a future state.

Small, however, would be the attainments of any man in science, were they confined within the limits of his own researches. Our knowledge of corporeal nature originates in those perceptions which we have by the organs of sense; and which, treasured up in the memory, we can, by the powers of reason and imagination, variously modify, arrange, and combine, so as from a number of particular truths to form to ourselves general principles. But these principles would be few indeed, had each individual no other materials of which to form them than the perceptions furnished immediately by his own senses. It has long been a matter of general regret, that the progress of science has been slow and laborious; but it never could have commenced, or could have only commenced, were every man obliged to begin his career from his own sensations, without availing himself of the discoveries of others who have travelled over the same ground before him.

To this narrow field, however, philosophical investigation is not confined. By means of the arts of writing and drawing, the discoveries of one individual may be made accessible to another, and the science of every age and of every country treasured up for the use of ages and countries the most remote. Hence arises the utility of what is generally called literature, or the knowledge of the languages, customs, and manners, which have prevailed among the various nations of the earth. Without this knowledge the science of the ancients would be locked up from the moderns; and even the discoveries of modern nations would be inaccessible to each other.

With all the aid which can be furnished by one age or nation to another, the labours of the philosopher still present themselves as immense and difficult. His object comprehends universal nature, of which nothing can be known but by sensation and reflection; but the objects of sense are all individuals, almost infinite in number, and for ever changing: so that instead of a system of science, the first view of the corporeal world would lead us to imagine, that from our most diligent researches nothing could be obtained but a vast collection of particular truths. Such a collection, whilst it would burden the memory, could be of little advantage to the arts of life; for we are very seldom brought, on different occasions, into circumstances so perfectly similar, as to require, without the smallest variation, the same conduct.
But though all the objects of sense, of memory, and of consciousness, are unquestionably individuals distinct from each other, the contemplative mind of man observes among them various resemblances and analogies. It observes, that the sensation communicated to the sight by snow is similar to that communicated by milk, paper, chalk, and a thousand other objects; that all external objects are solid, extended, divisible, and of some figure; that the path described by a planet round the sun resembles that described by a cannon ball over the surface of the earth; and that many of the actions of brutes are similar to those which we are impelled to perform by the internal feelings of desire and aversion.

This view of nature, quiescent and active, suggested to the philosopher the expediency of studying the vast multitude of objects which compose the universe; not individually, but in groups classified together according to their perceived resemblances or analogies. He saw that his labour would thus be at once shortened and rendered infinitely more useful; but he likewise saw, or ought to have seen, that it would by no means be taken wholly away. Much cautious attention is requisite to class objects in human systems as they are in fact classified in the system of nature. Analogies are apt to be mistaken for resemblances; a resemblance in a few particulars for a resemblance in all; and events, which have in reality very little in common, to be attributed to the same or similar causes. These mistakes can be avoided only by a painful induction of facts, by means of experiments accurately made on individual objects; and it was but very lately that induction was employed as the instrument of scientific research.

In ancient Greece, where philosophy first assumed a systematic form, all the objects of human thought were ranged under ten categories of predicaments; and every thing which could be affirmed or denied of these categories was supposed to be comprehended under five classes called predicables. Among the Greek philosophers, therefore, the use of induction was to ascertain the category to which any particular object belonged; after which, nothing more was to be done but, by a short process of syllogistic reasoning, to affirm or deny of that object whatever could be affirmed or denied of its category.

To this ancient arrangement of human knowledge many insuperable objections have been urged. But it must be confessed, that the arrangements which have been proposed in its stead, by the sages of modern times, have little claim to greater perfection. Locke classified all things under three categories; substances, modes, and ideas. Hume reduced the number to two; impressions and ideas. The former of these philosophers admitted of only four predicables, all different from those of the ancients; the latter at first extended the number to seven, but afterwards reduced it to three; among which none of the ancient predicables are to be found, and only one of those which had been admitted by Locke.

These different classifications of knowledge are the natural consequences of men's attempting what the greatest powers of the human intellect will never be able to accomplish. It certainly was the aim of Aristotle, or whoever was the inventor of the categories and the predicables, to delineate the whole region of human knowledge, actual and possible; to point out the limits of every district; and to assign to every thing which can be the object of human thought its proper place in the vast arrangement. Such an attempt evinces the ambition of its author: nor has the ambition been much less of some of those by whom the rash arrogance of the Stagyrite has been most severely cenured. Locke says expressly, that as the objects of our knowledge are confined to substances, modes, and ideas, so we can discover nothing of these, but 1st, their identity or diversity; 2nd, their relation; 3rd, their co-existence or necessary connection; and 4th, their real existence: while Hume declares, with some hesitation indeed, that we can know nothing but the resemblance, contiguity in time or place, and causation of our impressions and ideas.

These
These attempts, as well modern as ancient, to contrast the whole furniture of the human mind into the compass of a nut-shell, and to give at once a compleat chart of knowledge, have been cenured, not only as presumptuous, but as the fertile sources of error, by a philosopher whose writings do honour to this age and nation. "To make a perfect division (says Dr Reid), a man must have a perfect comprehension of the whole subject at one view. When our knowledge of the subject is imperfect, any division we can make must be like the first sketch of a painter, to be extended, contracted, or mended, as the subject shall be found to require. Yet nothing is more common, not only among the ancient but even among modern philosophers, than to draw from their work the whole ware, because there is no place in his ware room that fits it. We are apt to yield to make a division we can make, as the subject fits; for there is no place in his ware room that fits it. We are apt to yield to make a division, though it be not at all convenient order. The philosopher maintains, that such or such a thing is not, or should not be, in convenient order. The philosopher maintains, that such or such a thing is not, or should not be, in convenient order. The philosopher maintains, that such or such a thing is not, or should not be, in convenient order.

The truth of these observations will be controverted by no man who is not an absolute stranger to the various systems, ancient and modern, of what has been called the first philosophy.

But if every scientific arrangement of knowledge which has hitherto been proposed be so very imperfect,—what judgment are we to form of that which is adopted by the compilers of Dictionaries or Encyclopædias, in which the arts and sciences are arranged according to the order of the alphabet, and A, B, C, &c. considered as the categories? The author whom we have just quoted affirms, that of all methods of arrangement this is the most antiphilosophical; and if he allude only to such Encyclopædias as are mere dictionaries, in which the several arts and sciences are broken into fragments, scattered through the work according as the alphabet has happened to dispose of the various technical terms which have place in each, his assertion is unquestionably true. Its truth is indeed admitted by Chambers himself, the compiler of one of the first and most valuable of these dictionaries, who speaks of the works of his predeceffors as containing nothing but a multitude of materials, or a confused heap of incoherent parts. "Former lexicographers (says he) scarce attempted any thing like structure in their works; they seem not to have been aware that a dictionary is in some measure capable of the advantages of a continued discourse: and hence it is, that we see nothing like a whole in what they have done."

Proposing to remedy this defect in his own Dictionary of Arts and Sciences, he informs us, that "his view was to consider the several matters, not only in themselves, but relatively, or as they respect each other; both to treat them as so many wholes, and as so many parts of some greater whole; and to point out their connection with each other, and with that whole, by reference: so that by a course of references from generals to particulars, from premises to conclusions, from cause to effect, and vice versa, a communication might be opened between the several parts of the work, and the detached articles be in some measure replaced in the natural order of science, out of which the alphabetical order had removed them." To enable the reader with the greater ease to replace in the order of science the various articles scattered through the dictionary, he furnished him in the preface with what must be considered as an elegant analysis of human knowledge; by which may be seen, at one view, the mutual dependence of the several parts upon each other, and the intimate connection of the whole.

But though the sound judgment of Mr. Chambers thus directed him to make the arrangement of his Cyclopædia vastly preferable to that of any work of the same kind which had been published before it; we are afraid that, in its original form, it was still liable to the objections of Dr Reid. Had all the articles in the work been treated in sufficient detail to constitute, when reunited in the order of science, so many complete systems: yet the multitude of references was so great, that this reunion could not have been made but by a degree of irksome labour, to which few readers will ever submit.
mit (A). The work therefore, with all its improvements, was still a book of shreds and patches, rather than a scientific dictionary of arts and sciences; and considering the letters of the alphabet as the categories, the arrangement was certainly inconvenient as well as antiphilosophical.

Of this inconvenience, inseparable from a mere *dictionary* of arts and sciences, the original Compilers of the Encyclopædia Britannica were fully aware; and they resolved to construct their own Work upon a plan from which it might be completely removed. They were equally apprised with their predecessors of the utility of explaining by itself every technical term, and of illustrating every particular topic, in the wide circle of the arts and sciences; but they were at the same time sensible, that it is only by thinking in method, and reducing their ideas to the order of nature, that mankind can make

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(A) To be convinced of the truth of this assertion, one needs but to cast his eye over the author’s table of arrangement. It is as follows.

**Knowledge is either**

- **Natural and Scientific**, which is either —
  - Sensible; consisting in the perception of phenomena or external objects—called **Physiology or Natural History**; and which, according to the different kinds of such objects, divides into—
    - **Metaphysics**, which subdivides into **Ontology**, **Hydrology**, **Mineralogy**.
    - **Phytopology**.
    - **Zoology**.
    - **Analytic**.
    - **Natural Philosopby**
  - Abstracts—called **Metaphysics**, which subdivides into **Ontology**, **Analytic**, **Pneumatology**.
    - **Algebra**.
    - **Trigonometry**.
    - **Statics**.
    - **Conics**.
    - **Spheres**.
  - Quantities—called **Pure Mathematics**—which divides, according to the subject of the quantity, into —
    - **Geometry**—which
    - **Statics**
    - **Optics**, **Cataoptics**, **Dioptrics**, **Perspective**.
    - **Painting**.
    - **Music**.
    - **Hydrostatics**, **Hydraulics**.
    - **Pneumatics**.
    - **Alchemy**—whence **Natural Magic, &c.**
    - **Optics**, **Cataoptics**, **Dioptrics**.
    - **Perspective**—whence **Painting**.
  - Relations to our happiness—called **Religion**, the doctrine of —**Religion**, whence **Law**.
    - **Theology**, or **Religion**
    - **Politics**.
    - **Law**.
    - **Ethics**.
    - **Natural Philosopby**
  - Latent powers and properties of bodies—called **Chemistry**—whence **Alchemy**.
    - **Natural Magic, &c.**
    - **Optics**, **Cataoptics**, **Dioptrics**.
    - **Perspective**—whence **Painting**.
    - **Architecture**.
    - **Sculpture**.
    - **Trades and Manufactures**.
    - **The Military Art**.
    - **Fortification**.
    - **Chronology**.
    - **Dialling**.
    - **Navigation**.
    - **The Commerce**.
    - **Medicine**.
    - **Pharmacy**.
    - **Agriculture**.
    - **Gardening**.
    - **Furtraying**.
    - **Hunting**.
    - **Falconry**.
    - **Fishing**.
    - **Writing**.
    - **Artificial and Technical**, consisting in the application of natural notices to farther purposes, which is either —
    - **Real**, employed in discovering and applying the —
      - **Alchemy**—whence **Natural Magic, &c.**
      - **Optics**, **Cataoptics**, **Dioptrics**.
      - **Perspective**—whence **Painting**.
      - **Architecture**.
      - **Sculpture**.
      - **Trades and Manufactures**.
      - **The Military Art**.
      - **Fortification**.
      - **Chronology**.
      - **Dialling**.
      - **Navigation**.
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      - **Medicine**.
      - **Pharmacy**.
      - **Agriculture**.
      - **Gardening**.
      - **Furtraying**.
      - **Hunting**.
      - **Falconry**.
      - **Fishing**.
      - **Writing**.
    - **Internal**; employed in discovering their agreement and disaffection; or their relations in respect of truth called **Logics**.
      - **Alchemy**—whence **Natural Magic, &c.**
      - **Optics**, **Cataoptics**, **Dioptrics**.
      - **Perspective**—whence **Painting**.
      - **Architecture**.
      - **Sculpture**.
      - **Trades and Manufactures**.
      - **The Military Art**.
      - **Fortification**.
      - **Chronology**.
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      - **Gardening**.
      - **Furtraying**.
      - **Hunting**.
      - **Falconry**.
      - **Fishing**.
      - **Writing**.
    - **External**, which is either —
      - **Alchemy**—whence **Natural Magic, &c.**
      - **Optics**, **Cataoptics**, **Dioptrics**.
      - **Perspective**—whence **Painting**.
      - **Architecture**.
      - **Sculpture**.
      - **Trades and Manufactures**.
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      - **Falconry**.
      - **Fishing**.
      - **Writing**.

Such
neither make any progress in useful knowledge. To accomplish therefore effectually what Mr Chambers by means of his prefatory scientifical analysis attempted in vain, they endeavoured to give a compendious, yet clear and satisfactory, account of the several arts and sciences under their proper denominations, whilst the subordinate articles in each were likewise explained under their technical terms. These subordinate articles they divided into three kinds; of which the first consists of such as, independent of particular systems, admit of a full and complete illustration under their proper names; the second, of such as require to be partly discussed under the systems to which they belong, and partly under their own denominations; and the third, of such as appertain to systems of which all the parts must be elucidated together. Articles of the first kind admit of no references; those of the second, being only partially explained under their proper denominations, demand references to the systems where the illustrations are completed; and those of the last are wholly referred to the systems of which they are constituents.

Such has been the arrangement of the Arts and Sciences in every edition of the Encyclopædia Britannica; and it surely falls not under that cenure which Dr Reid pronounced with justice on many other works bearing a similar title.

In the spirit of true philosophy, that great man observes, that the same subject may admit, and even require, various divisions, according to the different points of view from which it is contemplated; and we doubt not but, if he had been asked, he would candidly have acknowledged, that the divisions and arrangement of the Encyclopædia Britannica are calculated to answer every purpose which can be expected from a general repository of arts, sciences, and miscellaneous literature. They are such as must give to readers of every description the most easy access to the objects of their pursuit; for whilst the philosopher or systematic artist may be fully and regularly informed by turning to the general name of the science or art which he wishes to explore, the man who has occasion to consult only particular topics will find them illustrated under the terms by which they are denominated. Contemplated from this point of view, the arrangement of the Encyclopædia Britannica needs not shrink from a comparison even with that of the Encyclopædia Methodique; for though that voluminous work, consisting of a dictionary of dictionaries, may have the appearance of being more systematically arranged; yet we, who have had occasion to consult it frequently, have never found the object the more readily for having been obliged to travel in quest of it through different alphabets.

A dictionary, in which the several arts and sciences are digested into distinct treatises or systems, whilst the various detached parts of knowledge are explained in the order of the alphabet, seem indeed to have received the best form of which such a work is susceptible; and may certainly be made to answer one end, which more philosophical arrangements never can accomplish. Under the various letters of the alphabet, it is obvious that the whole circle of the sciences may be completely exhausted; and that every discovery, ancient or recent, may be referred to the particular system which it tends to.

Such is that great and general analysis of knowledge, which has by some of our correspondents been recommended to us in terms of the highest praise, and to which elegance and accuracy cannot perhaps be refused. Its utility, however, as prefixed to a dictionary of arts and sciences, is not very apparent. From each word, which in this table is printed in capitals, many branches are made to spring, which in the dictionary are all treated as separate articles. Thus from Meteorology we are referred, in a subordinate analysis, to Air and the Atmosphere; including, 1st, The history of its contents, æther, fire, vapour, exhalation, &c. 2d, Meteors formed therein; as cloud, rain, shower, drop, snow, hail, dew, damp, &c. Rainbow, Parhelion, Halo, Thunder, Waterspout, &c. Winds, Monsoon, Hurricane, and the like. As every word printed in capitals, as well as in this subordinate division as in the general table, is the title of an article treated separately in the Cyclopædia, we must turn backwards and forwards through more than 24 references before we come at the detached topics, which we are directed to unite into a system of Meteorology. The number of articles which must be united in the same manner to constitute the Compiler's system of Metaphysics is upwards of 48; and those which are referred to Theology above 300!
tends to confuse or to confirm, without having recourse to the awkward expedient of employing several alphabets, or the still more inconvenient arrangement by which the systems themselves are broken into fragments.

But on this topic it is needless to expatiate. The very favourable reception with which the two former editions of the Encyclopædia Britannica were honoured by the Public; the still greater encouragement which has been given to the present; and the adoption of the plan by the editors of other repositories of arts and sciences—bear ample testimony to the excellence of the arrangement. On this subject we express ourselves with the greater ease and the greater confidence, that we cannot be accused of flattering our own vanity, or publishing our own praifes; for the merit of forming the arrangement, as well as of introducing into the work various branches of knowledge, from which, as they are not generally to be found in dictionaries, it derives a just claim to the favour of the Public, belongs not to the Compilers of the present Edition.

After surveying any particular art or science, our curiosity is excited to acquire some knowledge of the private history of those eminent persons by whom it was invented, or has been cultivated and improved. To gratify this curiosity, those who formed the plan of the Encyclopædia Britannica resolved to enrich it with a department not to be found in any prior collection of the same kind except the French Encyclopédie.

Of all the various species of narrative-writing, it is acknowledged that none is more worthy of cultivation than Biography; since none can be more delightful or more useful, none can more certainly enchain the heart by irresistible interest, or more widely diffuse instruction to every variety of condition. Its tendency to illustrate particular passages in general history, and to diffuse new lights through such arts and sciences as were cultivated by the persons whose lives are related, are facts too obvious to require proof. It exhibits likewise the human character in every possible form and situation. It not only attends the hero through all the baffle of public life, but pursues him to his most sequestered retirements. It shows how distinguished characters have been involved in misfortunes and difficulties; by what means they were extricated; or with what degree of fortitude and dignity they discharged the various functions, or sustained the vicissitudes, sometimes prosperous and sometimes adverse, of a chequered and a fluctuating life. In such narratives men of all ranks must feel themselves interested; for the high and the low, as they have the same faculties and the same fentiments, have no less similarity in their pains and pleasures; and therefore in the page of honest biography, those whom fortune or nature has placed at the greatest distance, may mutually afford instruction to each other. For these reasons it is, that every man of learning and taste has esteemed the biographical labours of Plutarch among the most valuable and interesting remains of antiquity.

The lives and characters, therefore, of such persons as have excelled in the arts either of war or of peace, of such as have distinguished themselves either on the theatre of action or in the recesses of contemplation, will be found in the Encyclopædia Britannica alphabetically disposed under their proper names. Many indeed are omitted, for whom the reader will naturally look; some because, in the order of the alphabet, we had passed the initial letters of their names before we had intelligence of their deaths; others, through the inadvertency, whether excusable or not, of the Editors; several, for a reason which shall be afterwards assigned for omissions of a different kind, and perhaps of greater importance; and a very few from the contemptuous refusal of their friends to answer the Editor's letters respectfully requesting the necessary information (b).

But

(b) Of this treatment we have not indeed often had occasion to complain. While men of the first eminence in church and state have readily answered the letters that were addressed to them, and either communicated the in-
But while one part of our readers will regret that we have given no account of their favourite philosopher, hero, or statesman, others may be disposed to remark, that we have dragged from obscurity the names of many persons who were no proper objects of such public regard. To these we can only reply, that, with the greatest biographer of modern times, we have long thought that there has rarely passed a life of which a faithful narrative would not be useful; and that in the lives of the most obscure persons, of whom we have given any account, we saw something either connected with recent discoveries and public affairs, or which we thought capable of affording a lesson to great multitudes in similar circumstances.

Between eminent achievements and the scenes where they were performed, there is a natural and necessary connection. The character of the warrior is connected with the fields of his battles; that of the legislator, with the countries which he civilized; and that of the traveller and navigator, with the regions which they explored. Even when we read of the persons by whom, and the occasions on which, any particular branch of knowledge has been improved, we naturally wish to know something of the places where such improvements were made. This curiosity, so natural and so laudable, has been frequently felt by ourselves during the compilation of this Work; and to gratify it in others, we have subjoined to the name of every considerable place an account of its situation, its climate, its soil, its peculiarities, its inhabitants, with their manners, customs, and arts; its revolutions, laws, and government, with whatever else appeared necessary for the readers information, and at the same time admissible into a work of such variety and extent. It is indeed probable, that by many of our readers we shall be thought to have done too much rather than too little in this department; and to have filled our pages with accounts of towns and villages not of sufficient importance to demand general attention. But were it known how many of such places we have excluded from our Work, though recommended to us by some of our most obliging correspondents, those who reflect upon the different tastes of mankind, and consider that we wrote for the Public at large, would forgive us for having occasionally employed a few sentences in the description of others, which, whatever be their real importance, could not have been omitted without disappointing a very numerous class of readers.

The knowledge of history is so important, not only to the statesman and the legislator, to whom indeed it is absolutely necessary, but likewise to every man who moves in a sphere above that of the lowest vulgar, that a Work professing to be a general repository of arts, sciences, and literature, would be exceedingly defective, if it did not contain some information of the transactions of those who have been in possession of the world before us; of the various revolutions of states and empires; and of all the other means which have contributed to bring every thing into the state in which we behold it. Fully aware of this, the compilers of the Encyclopaedia Britannica, besides giving a general view of universal history and chronology, have enriched this edition with a short, though they hope luminous, detail of the progress of each particular nation, which from the remotest period to the present time has acted a conspicuous part on the theatre of the world. The reader therefore will here find a very comprehensive view of Civil History, ancient and modern, in all its branches. Nor have the histories of Nature and Religion been neglected. Of the former, it is not perhaps too much to say, that in all the subdivisions of its three great kingdoms, it will be found more fully, more accurately, and more scientifically, detailed in this Work than in any other dictionary which has yet been published. Of the latter, a brief view is given under the general article History; the unavoidable defects of which are in a great measure supplied

Information which was requested, or politely assigued reasons for withholding the lives of their friends not to be published in the Encyclopaedia Britannica, the Editor recollects but two men, who maintained a full silence; and these he cannot consider as moving in a sphere much higher than his own.
The accounts that will be found, under their proper denominations, of all the considerable sects and opinions which have prevailed in the religious world from the earliest periods to the present day.

Such was the plan of the second edition of the Encyclopædia Britannica; to which, as it seems hardly capable of improvement, the Compilers of the third have, with a few slight variations, strictly adhered. Still, however, there was ample room for the efforts of all their industry and all their learning; for the rapid progress of the physical sciences had rendered the labours of their predecessors in many departments useless. Besides the introduction of some thousands of new articles, there are not many of great importance, those in biography and geography alone excepted, which stand in this Edition as they stood in the last. Such recent discoveries as could be introduced, have been mentioned with reference to their proper authors; and, while the several sciences have been treated more fully and systematically, greater care has been employed to trace the history of each from its first invention, and to apply them all to the arts of life.

To accomplish a task so arduous and so important, neither labour nor expense has been spared. Literary journals; the memoirs and transactions of philosphic societies; and all the most valuable dictionaries of arts and sciences, both in our own and in other languages, have been constantly consulted. The works of the most eminent authors, as well ancient as modern, who have written on any particular art or science, have been collected and compared. Such of them as treat of topics, about which there is no room for controversy, and are at the same time susceptible of abridgment, have been abridged with the greatest care; whilst others, more concise and tenacious of their subjects, have been more closely pursued and more faithfully retained. Upon those branches of science on which the works of other authors furnished nothing fit for the purpose of the Editors, original essays and treatises are inserted, which were composed either by themselves, or by such of their friends as they knew to be intimately acquainted with the subject. On disputed points, whether in the physical or moral sciences, arguments and objections have been displayed in their full force; and of each of the various sects into which the Christian church is divided, the account is generally given by the most eminent clergyman of that sect to whom the Editors could find access.

After the utmost exertions, however, of our attention and industry, we are sensible, perhaps more sensibly than any of our readers, that the Work pales from our hands in a state far from perfection; and that the man who shall not discover in the Encyclopædia Britannica mistakes, needless repetitions, and even culpable omissions, will bring to the examination of it no great flock of general knowledge. But for these offences the Editors perhaps need no other apology than what will be furnished by the nature of the Work and the history of its publication.

In a collection so extensive and multifarious, a few mistakes, repetitions, and omissions, might surely be passed over without severity of censure, although the publication had from the beginning to the end been superintended by the same man; but they will be allowed to have been almost unavoidable, when it is known that, after the Work was far advanced, it was committed to the care of a new Editor, who, though he was in a great degree a stranger to the contents of the printed volumes, found no clue of his predecessor’s which could guide him accurately through those to be compiled.

We beg it to be understood, that this observation is not made with a view to remove any share of blame from the second to the first Editor; for Mr Colin Macfarquhar, who conducted the publication beyond the middle of the twelfth volume, was a man whom few who knew him will be disposed to blame, and on whose industrious integrity those who knew him best must admit that it would be difficult to bestow too much praise. Born in Edinburgh of parents respectable, though not affluent, he was, at an early period of life, bound an apprentice to a printer. This profession gave him a taste for science and literature, or rather furnished him with opportunities
tunities of cultivating the taste which he derived from nature: and he soon became well acquainted with the most popular writers in natural history and in natural and moral philosophy. When he opened a printing-house of his own, rectitude of conduct quickly recommended him to friends and to employment; and the unremitting prosecution of his studies eminently qualified him for superintending the publication of a new dictionary of arts, sciences, and literature; of which, under the title of Encyclopædia Britannica, the idea had been conceived by him and his friend Mr Andrew Bell engraver. By whom these gentlemen were assailed in digesting the plan which attracted to that Work so much of the public attention, or whether they had any assistance, are questions in which our readers cannot be interested. Suffice it to say, that Mr Macfarquhar had the sole care of compiling the present Edition; and that, with the aid of a very few literary friends, he brought it down to the article Mysteries, in the twelfth volume, when he was cut off in the 48th year of his age by a death which, though not sudden, was perhaps unexpected. His career was indeed short; but of him it may be said with as much propriety as of most men, Nemo parum diu vixit, qui virtutis perfecta perfecto funtus est munere.

Among his literary correspondents was the Reverend Dr Gleig of Stirling, who had written for him various articles, of which some were published during his lifetime and others in their order after his death. These shall be afterwards enumerated with those furnished by other occasional contributors; but they are mentioned at present, because they account for that partial regard of Mr Macfarquhar for their author, which, on the death of the former, induced the trustees for his children, together with Mr Bell the surviving partner, to request the latter to undertake the task which their deceased friend had hitherto discharged with so much credit to himself. In this proposal, after some hesitation on account of his distance from Edinburgh, Dr Gleig acquiesced; but when he entered on his new office, he found matters in a state of no little confusion. Mr Macfarquhar, though his death had not been long expected, had laboured long under a complication of diseases; the consequence of which was, that the materials which he had prepared for the press were almost exhausted; and of those which were first called for, some had not passed through his correcting hand.

This circumstance may perhaps account for some defects and inaccuracies in that part of the Work, to which the second Editor looks back with the least satisfaction: but that which must be his apology for several repetitions and omissions, was the neglect of his predecessor during his last illness to make an intelligible index to his own labours. From the want of such a necessary guide, Dr Gleig was perpetually liable, notwithstanding his utmost circumspection, to give under one title an explanation of subjects which had been before explained under another; and to omit articles altogether, from a persuasion that they had been discussed in some preceding volume under the general system to which they belong.

Neither his repetitions nor omissions, however, are so many as some have supposed them; for what has been hastily cen.cured as a repetition, is frequently nothing more than the necessary resumption of some important subject. Availing himself of the excellence of the plan upon which the Encyclopædia Britannica is constructed, he took the opportunity, when he found any system superficially treated, to supply its defects under some of the detached articles belonging to it. Of this he shall mention as one instance Hydrostatics; which, considered as a system, must be considered to be defective; but he trusts that its defects are in a great measure supplied under the separate articles Resistance of Fluids, River, Specific Gravity, and Water-Works.

That in the Encyclopædia Britannica no account is given of some things which should have a place in a general repository of arts, sciences, and miscellaneous literature, must be acknowledged; but it must likewise be acknowledged that such omissions are neither numerous nor very important; for many subjects, which have been supposed to be omitted, are treated under titles different from those under which they have
have been looked for. Thus the method of calculating compound interests, which one of our correspondents cannot find in our Work, is taught in the article Algebra; that of coating mirrors, of which another complains that no account is given, will be found under the term Foliating; and though it may be true, according to the peevish remark of a third, that the reader is nowhere directly instructed how to grind optical glasses, yet if he read the article Glass-Grinding, and understand the doctrine of lenses as laid down in the article Optics, he will easily, if an artist, discover a method of performing that operation for himself.

Omissions, however, there are towards the end of the Work; not the consequence of carelessness, but the offspring of necessity.

In an address to the Purchasers of the Encyclopaedia Britannica, subjoined to the ninth volume, the proprietors gave a rash promise to comprehend the whole of their undertaking within the limits of eighteen; and if intervening discoveries should make it necessary, to enlarge the last volumes in quantity without any additional charge to Subscribers.

That the promise was rash, a moment's reflection should have taught them; for in the present rapid progress of physical science, when new discoveries are daily made, it was obviously impossible, at so early a period, to ascertain with precision how many volumes would be necessary to bring a Work of such comprehensive variety to the utmost perfection of which it is capable. This was indeed soon discovered; but the proprietors shrunk not from their engagement, which they determined to fulfil to the utmost extent of its meaning, till the additional tax, which in 1795 was laid upon paper, involved them in difficulties which they had not foreseen. By the act of parliament they were indeed authorized to reimburse themselves by raising the subscription-price of their volumes; but they chose rather to submit to a diminution of profit, than to take even a legal advantage of that public by which they had hitherto been so generously supported.

To complete their plan, however, in its original extent, was now impossible, without a violation of the sacred duties which they owe to themselves and to their families. In this dilemma the Editor proposed that they should state the case to their Subscribers, of whom he is confident that nine-tenths would have released them from the obligation of their promise: but after long deliberation, they judged that it would be more acceptable to the public at large to comprehend the Work in the proposed number of volumes, though they should exclude from the last such articles as might be omitted without injury to science or the arts of life. If by any of their readers they shall be thought to have erred in this judgment, let them not, however, be too severely blamed; for they have done much to adhere to the spirit of their promise; and, in the large addition made to the bulk of the last volume, have shewn that they prefer their honour to their interest. Several things have indeed been excluded; but except such recent discoveries as could not be noticed under the last letters of the alphabet, it is believed that very little has been omitted which can be considered as of great or general importance. At any rate, the Editor flatters himself, that the last six volumes of the Encyclopaedia Britannica do not disgrace those by which they are preceded, and that the whole will bear to be compared with any other Work of the same kind extant. Imperfect it certainly is: "but if much has been omitted, let it be remembered that much has likewise been performed;" that perfection is not to be looked for in the works of man; and that every compilation of such variety and extent should be examined with the spirit which actuated one of the greatest critics of antiquity when perusing the works of his brother poets:

Verum ubi plura niteant in carmine, non ego paucis
Offendam maculis, quas aut incuria judit,
Aut humana parum cavit natura.—

Hor. De Art. Poet.
We mentioned our obligations to occasional contributors; and many of our correspondents have expressed an earnest desire to know who these contributors have been. As there can be no impropriety in gratifying such a desire, we shall conclude this Preface, by assigning the various articles, not compiled by the Editors themselves, to their respective authors: but as many of the writers for the first twelve volumes were known to Mr. Macfarquhar alone, they will not attribute the omission of their names to culpable design, but to irremediable ignorance.

For whatever instruction may be conveyed in the articles Anatomy and Surgery the Public is indebted to Andrew Bell, F. S. A. one of the proprietors, and the ingenious Mr. Fyfe. From the former of these gentlemen the world will soon receive one of the most splendid anatomical works which it has yet seen; and as the latter has long officiated under Dr. Monro as dissector in the anatomical school of the University of Edinburgh, it is needless for us to say how well he must be acquainted with the subjects on which we employed him to write. Aerology, Aerostation, Chemistry, Electricity, Gunnery, Hydrometrical, Mechanics, Meteorology, with most of the separate articles in the various branches of natural history, we have reason to believe were compiled by Mr. James Tytler chemist; a man who, though his conduct has been marked by almost perpetual imprudence, possesses no common share of science and genius. The article Blind was furnished by Dr. Blacklock and Dr. Moyes, both blind themselves, and both men of superior attainments; the former in elegant literature, and the latter in the physical sciences. We believe that the article Education was composed by Mr. Robert Heron, author of a history of Scotland now publishing, who likewise furnished the greater part of what we have published under the titles Religion and Society. The lives of Johnson and Mary Queen of Scots, with the articles Instinct, Love, Metaphysics, Miracle, the history Ethics under Moral Philosophy, Oath, Passion, Plastic Nature, Polytheism, Prayer, Slavery, and Supper of the Lord, were contributed by Dr. Gleig, Editor of the last six volumes; Grammar (c) and Theology by Dr. Gleig and the Reverend James Bruce, A. B. late of Emanuel College, Cambridge; and Motion by Dr. Gleig and Mr. Tytler. The system of Medicine, which was published in the former edition, was revised and improved for the present by Andrew Duncan, M. D. Fellow of the Royal Society of Edinburgh, and Professor of the Institutes of Physic in the University. The notes to the article Music were contributed by Dr. Blacklock, and the history of the art by William Maxwell Morison, Esq.; advocate, who likewise favoured us with what we have published on the science of Physiognomy. The articles Mysteries, Mythology, and Philology, we owe to the erudition of David Doig, L. L. D. F. S. A. Master of the Grammar-School of Stirling, and author of two very ingenious Letters on the Savage State, addressed to the late Lord Kames. Navigation, Parallax, Pendulum, Projection of the Sphere, Ship-Building, and Naval Tactics, were furnished by Andrew Mackay, L. L. D. F. R. S. E. of Aberdeen, and known to the Public as author of a treatise on the Theory and Practice of finding the Longitude.

(c) Mr. Bruce, who communicated the most valuable parts of the article Grammar, and who was for many years a student in the University of St. Andrews, will, from gratitude to his old master, to declare, in this public manner, that, to the instructions of Dr. Hunter, professor of Humanity in that University, he is indebted for much of what philological knowledge he may possess. We believe indeed that Dr. Hunter may claim as his own the theory which we have given of the cases of nouns, the doctrine concerning the inverse acceptation of the adjective, and the resolution of the relative pronoun by means of the preposition of instead of the conjunction and. There is nothing else in our article which the attentive reader may not find in the grammatical writings of Vossius, Scaliger, Sanesius, Perizonius, Wallis, Rudddman, Harris, Horne-Tooke, and Dr. Gregory of Edinburgh. Discoveries in grammar are not indeed to be looked for. They are nearly allied to those in metaphysics; of which, it has been well observed by one of the acutest writers of the age, that the very appearance should be rejected as an error, if not as an imposition, upon mankind.
Longitude at Sea or Land. John Robison, M. A. secretary to the Royal Society of Edinburgh, and professor of natural philosophy in the University, did the Editor the honour of contributing to the Encyclopædia Britannica the valuable articles Physics, Pneumatics, Precession of the Equinoxes, Projectiles, Pumps, Resistance of Fluids, River, Roof, Rope-Making, Rotation, Seamanship, Signals, Sound, Specific Gravity, Statics, Steam and Steam Engine, Strength of Materials, Telescope, Tide, Articulating Trumpet, Variation of the Compass, and Water-Works. Philosophy is the joint production of Professor Robison and Dr Gleig. Physiology was furnished by John Barclay, M. D. of Edinburgh, whose merits, if the Editor be not partial to his friend, it will raise high in the estimation of men of science. The essays on Predestination and Providence were contributed by Robert Forsyth, Esq. advocate; the account of the French Revolution by Mr. Forsyth and Dr Gleig; and Oxygen and Phlogiston by John Rotheram, M. D. professor of natural philosophy in the University of St Andrew's.

The other contributors to the first part of the Work we cannot enumerate; but we know that much useful information was occasionally communicated by Dr Latham of Dartford in Kent, the celebrated ornithologist; by Dr William Wright Physician-general to the forces in the West Indies under the command of Sir Ralph Abercrombie; by the Reverend J. Hawkins, vicar of Halstead in Essex; by the late Mr Adams, mathematical instrument-maker to his Majesty; and by Mr William Jones, optician in Holborn, London. There is, however, no man to whom the Proprietors of the Encyclopædia Britannica feel themselves under greater obligations than to Dr Black, for the very handsome offer which he made to the person who was at first entrusted with the chemical department of the Work. And while they express thus publicly their gratitude to him, may not the Editor declare how much he is indebted to his two assistants, the Reverend James Walker, M. A. of St John's College, Cambridge, and Mr James Thomson of Crieff, preacher in the church of Scotland? Of these gentlemen, who successively had the care of the Work when he was necessarily absent, he could always say, Lyibus in rebus ipsi interesse non possimus, in his, opera nobis vicaria fides amicorum supponitur.

TO the above preface of the European Editors the publisher of the American Edition begs leave to add, that neither care nor expense have been spared to render the work worthy of the Public attention. Some articles have been written anew, several of original matter have been inferted, and many have been revifed and important improvements made in them, indeed, through every volume useful though minute improvements have been introduced which contributed to the excellence of the work. The engravings, the paper, and the general execution of the work must speak for themselves, on this score the publisher thinks he has not much cenfure to fear; for typographical inaccuracies, which are comparatively few, he has no apology to offer, but flatters himself that in a work of such variety and extent the candid reader will view them with indulgence.

From the nature of the work many things must be expected to be imperfect, and some through inadvertence omitted, thefe, with a variety of original materials are proposed to be taken up in a supplementary volume.

ENCYCLOPAEDIA.
A. THE first letter of the alphabet, in all the known languages of the world, that of Ethiopia excepted, in which it is the 13th. It has deferredly the first place in the alphabet on account of its simplicity, very little more being necessary to its pronunciation than opening the mouth.

In the English language A is the mark of three different sounds, termed, by our grammarians the broad, the open, and the flender A. The flinding sound of the German A, is found in several monosyllables, as wall, talk, &c. and is pronounced as au in cause. It is probable that the Saxons expressed only this broad sound of the letter, as it is still commonly retained in the northern districts of England, and universally throughout Scotland; as talk for talk, wake for walk or wake. The open A resembles that of the Italians in adagio, and is the same with that of a in father, rather, &c. The flender sound is peculiar to the English language, and resemles the sound of the French diphthong ai in paix, or their a masculine, or perhaps it is a middle sound between them: it is exemplified in place, waste, &c. also in mitigation, justification, and all other words ending with aion.

A is sometimes added after words in burlesque poetry; in which case it only makes an additional syllable without any alteration of the sense, as the interjection O very often does in our ballads. It is also sometimes redundant, as in the words arise, awake, &c. which are not different in significiation from rise, wake, &c.

It is sometimes a word, either noun or interjection; in which case it is commonly an expression of grief, and joined with the aspirate, as ab! When a noun, it is only with respect to itself; as great A, little a, &c.

A is very frequently used as an article; in which case it has no plural significiation, and is used to denote the number one, as a house, a field, &c. When placed as an article before any of the vowels, y and w only excepted, it is joined with the letter u; as, an island, an orator, &c. In the three following cases it is a preposition.

1. When it goes before a participle, or noun derived from a participle; as, I am a doing this or that. 2. When used before local surnames, as Cornelian a Lapide, Thomas a Kemps, &c. 3. When it is used in composition; as, a foot, a steep, &c. In some infinances it denotes the proportion of one thing to another; as so much a week, a man, a head, &c.

A, among the ancients, was a numeral letter, and signified 500; and when a dash was added on the top, A, 5000.

A, in the Julian calendar, is the first of the seven dominical letters. It had been in use among the Romans long before the establishment of Christianity, as the first of the eight mundanes litterae; in imitation whereof it wasthat the dominical letters were first introduced.

A is also an abbreviation used with different intentions. Hence, A, among logicians, is used to denote an universal affirmative proposition; according to the verfe, Affertit A, negat E, verbum generaliter ambe. Thus, in the first figure, a syllogism consisting of three universal affirmative propositions, is said to be in Bár-bā-rā; the A thrice repeated, denoting so many of the propositions to be universal, &c. See BÁRBARA.

A, among the Romans, was used in the giving of votes or suffrages. When a new law was proposed, each voter had two wooden ballots put in his hand; the one marked with a capital A, signifying antiquo, q. d. antiquum volo; and the other with V. R. for ut regas. Such as were against the law, cast the first into the urn; as who should say, I refuse it, I antiquate it; or, I like the ancient law, and despise no innovation. A, in the trials of criminal causes, also denoted absolution; whence Cicero, pro Milone, calls A, littera falutari, a saving letter. Three ballots were distributed to each judge, marked with the letters, A for absolvere, I acquir; C for condemnare, I condemn; and N. L. for non iugis. It is not clear. From the number of each cast into the urn, the prætor pronounced the prisoner's fate. If they were equal in number, he was abvolved.

A, in the ancient inscriptions of marbles, &c. occasionally stands for Augustus, ager, aevum, &c. When double it denotes Augusti; when triple, urum, artem, as; and sometimes its meaning can only be known by the rest of the inscription. Isidore adds, that when it occurs after the word miles (soldier), it denotes him young. On the reverse of ancient medals, it denotes them struck by the city of Argos, sometimes by that of Athens; but on coins of modern date, it is the mark of Paris.

A, as an abbreviation, is also often found in modern writers: as, A. D. for anno Domini: A. M. artium magister, master of arts, &c.

A, the letter a, with a line above it, thus, a, is used in
Aaron, the name of several rivers in Germany and Switzerland.

AACH, a little town in Germany, in the circle of Suabia, near the source of the river Aach, and almost equally distant from the Danube and the lake Constance. It belongs to the house of Austria. E. Long. 9. 6. Lat. 47. 55.

AAHUS, a little town in Germany, in the circle of Westphalia, and bishopric of Munster. It is the capital of Ahus, a small district; has a good cattle; and lies north-east of Coesfeldt. E. Long. 7. 1. Lat. 52. 10.

AAM, or HAAM, a liquid measure in common use among the Dutch, and containing 128 measures called mingles, each weighing nearly 16 ounces avoidapoise; whence the Aam contains 218 English, and 148 French Paris measure.

AAR, the name of two rivers, one in Switzerland, and another in Westphalia in Germany. It is also the name of a small island in the Baltic.

AARASUS (anc. geogr.), a town of Pilidia, in the Hither Asia, thought to be the Analias of Ionia.

AARON, high-priest of the Jews, and brother to Moses, was by the father's side great grandson, and by the mother's grandson, of Levi. By God's command he met Moses at the foot of mount Horeb, and they went together into Egypt to deliver the children of Israel; he had a great share in all that Moses did for their deliverance; the scriptures call him the prophet of Moses, and he acted in that capacity after the Israelites had crossed over the Red Sea. He attended mount Sinai with two of his sons, Nadab and Abihu, and seventy elders of the people; but neither he nor they went higher than half way, from whence they saw the glory of God: only Moses and Joshua went to the top, where they slaid forty days. During their absence, Aaron, overcome by the people's eager entreaties, set up the golden calf, which the Israelites worshipped by his consent. This calf has given rise to various conjectures. Some rabbis maintain that he did not make the golden calf; but only threw the gold into the fire, to get rid of the importunities of the people; and that certain magicians, who mingled with the Israelites at their departure from Egypt, cast this gold into the figure of a calf. According to some authors, the fear of a falling a sacrifice to the recompence of the people by giving a refusal, made Aaron comply with their desire; and they all did the like, that he hoped to elude their request, by demanding of the women to contribute their ear-rings, imagining they would rather choose to remain without a visible deity, than be deprived of their personal ornaments. This affair of the golden calf happened in the third month after the Israelites came out of Egypt. In the first month of the following year, Aaron was appointed by God high-priest; which office he executed during the time that the children of Israel continued in the wilderness. He died in the fortieth year after their departure from Egypt, upon mount Hor, being then 123 years old; A.M. 3522, of the Julian period 3262, before the Christian era 1452. With regard to the attempts of the Egyptian magicians to imitate the miracles performed by his rod, see some remarks under the article MAGICIAN.

AARON and JULIUS (Saints) suffered martyrdom together, during the persecution under the emperor Diocletian, in the year 303, about the same time with St. Alban, the protomartyr of Britain. We are no where told what their British names were, it being usual with the Christian Britons, at the time of baptism, to take new names from the Greek, Latin, or Hebrew. Nor have we any certainty as to the particulars of their death; only that they suffered the most cruel tortures. They had each a church erected to his memory; and their festival is placed, in the Roman martyrology, on the first of July.

AARON, or Harun, Al Rafehid, a celebrated khalif, or Mahometan sovereign of the Saracen empire; whose history is given under the article of BAGDAD.

AARON Harfledon, a learned rabbi and CARAITE in the 15th century, wrote an Hebrew grammar, printed at Constantinople in 1581; probably the same with Aaron the caraite, who wrote a commentary on the five books of Moses, which is in MS. in the French king's library.

AARSENS (FRANCIS), Lord of Somedlyck and Spyck, was one of the greatest ministers for negociation the United Provinces could ever boast of. His father, Cornelius Aarfsens, was Regifter to the States; and being acquainted with Mr Pleiffs Mornay, at the Court of William Prince of Orange, he prevailed upon him to take his son under him, with whom he continued some years. John Olden Barnewelt, who presided over the affairs of Holland and all the United Provinces, sent him afterwards agent into France, where he learned to negociate under those profound politicians Henry IV, Villeroi, Sillery, Bossu, Jaonin, &c. and he acquitted himself in such a manner as to obtain their approbation. Soon after, he was invested with the character of ambassador, being the first who was recognized as such by the French court; at which time Henry IV, declared, that he should take precedence next to the Venetian minister. He resided in France 15 years; during which time he received great marks of esteem from the king, who created him a knight and baron; and for this reason he was received amongst the nobles of the province of Holland. However, he became at length so odious to the French court, that they desired to have him recalled. He was afterwards deputed to Venice, and to several German and Italian princes, upon occasion of the troubles in Bohemia. He was the first of three extraordinary ambassadors sent into England in 1620, and the second in 1641; in which latter embassy he was accompanied by the Lord of Brerode as first ambassador, and Heemvuyt as third, to treat about the marriage of Prince William, son to the Prince of Orange. He was likewise ambassador-extraordinary to the French court in 1624, and the Cardinal de Richelieu having jut
ABA [ 3 ]

ABA. (or Abad) Hanifah or Hanfah, surnamed Al-Nooma, was the son of Thaber, and born at Coufah in the 80th year of the Hegira. This is the most celebrated doctor of the orthodox Mussulmans, and his sect holds the principal cectism among the four which they indifferently follow. Notwithstanding this, he was not very well esteemed during his life, inasmuch that the khalif Almanfar caused him to be imprisoned at Bagdad, for having refused to subcribe to the opinion of abolute predestination, which the Mussulmans call Cadha. But afterwards Abou Jofeph, who was the sovereign judge or chancellor of the empire under the khalif Hadi, brought his doctrine into such credit, that it became a prevailing opinion, That to be a good Mussulman was to be a Hanifite. He died in the 150th year of the Hegira, in the prison of Bagdad aforesaid: and it was not till 335 years after his death, that Melick Schah, a sultan of the Seljoucidan race, built for him a magnificent monument in the same city, whereunto he joined a college peculiarly appropriated to such as made a profession of this sect. This was in the 485th year of the Hegira, and Anno Christi 1093. The most eminent succedors of this doctor were Ahmed Benali, Ali Giadas, and Al Razi who was the master of Naftari; and there is a mosque particularly appropriated to them in the temple of Mecca.

ABA, Abas, Abos, or Abis, (anc. geog.), the name of a mountain of Greater Armenia, situated between the mountains Niphatos and Nibonis. According to Strabo, the Ephruses and Araxes rose from this mountain; the former running eastward, and the latter westward.

ABA. See ABA.

ABACENA (anc. geog.), a town of Media, and another of Caria in the higher Asia.

ABACENUM (anc. geog.), a town of Sicily, whose ruins are supposed to be those lying near Trippi, a citadel on an high and steep mountain not far from Messina. The inhabitants were called Abaceniini.

ABACATUAIA, in ichthology, a barbarous name of the zee womer. See ZEUS.

ABACH, a market town of Germany, in Lower Bavaria, seated on the Danube. It is remarkable for Roman antiquities, and for springs of mineral waters, which are said to be good for various diletments. E. Long. 11. 36. N. Lat. 48. 53.

ABACINARE, or ABACINARE, in writers of the middle age, a species of punishment, confining in the binding of the criminal, by holding a hot basin or bowl of metal before his eyes.

ABACK (a sea-term), the situation of the falls when their surfaces are slacked against the masts by the force of the wind. The falls are said to be taken aback when they are brought into this situation, either by a sudden change of the wind, or by an alteration in the ship's course. They are laid aback, to effect an immediate retreat, without turning to the right or left; or, in the sea phrase, to give the ship stern-way, in order to avoid some danger discovered before her in a narrow channel, or when she has advanced beyond her station in the line of battle, or otherwise. The falls are placed in this position by slackening the lee-bridges, and hanging in the weather ones; so that the whole effort of the wind is exerted on the forepart of the surface, which readily pulses the ship after, unless she is restrained by some counteracting force. It is also usual to spread some fall aback near the stern, as the mizzen top-sail, when a ship rides with a single anchor in a road, in order to prevent her from approaching it so as to entangle the flukes of it with her slackened cable, and thereby loosen it from the ground.

A 2

ABACOT,
ABACOT, the name of an ancient cap of state worn by the kings of England, the upper part whereof was of the form of a double crown.

ABACTORS, or ABACTORES, a name given to those who drive away, or rather steal, cattle by herds, or great numbers at once; and are therefore very properly distinguished from furets, or thieves.

ABACUS, among the ancients, was a kind of cupboard or buffet. Livy, describing the luxury into which the Romans degenerated after the conquest of Asia, says, They had their abaci, beds, &c. plated over with gold.

ABACUS, among the ancient mathematicians, signified a table covered with dust, on which they drew their diagrams; the word in this sense being derived from the Phoenician abak, dust.

ABACUS, in architecture, signifies the superior part or member of the capital of a column, and serves as a kind of crowning to both. Vitruvius tells us the abacus was originally intended to represent a square tile laid over an urn, or rather over a basket. See Architecture, note 15. The form of the abacus is not the same in all orders; in the Tucan, Doric, and Ionic, it is generally square; but in the Corinthian and Composite, its four sides are arched inwards, and embellished in the middle with some ornament, as a rose or other flower. Scamozzi ues abacus for a concave moulding on the capital of the Tucan pedestal; and Palladio calls the plinth above the echinus, or boul- tin, in the Tucan and Doric orders, by the same name.

ABACUS is also the name of an ancient instrument for facilitating operations in arithmetic. It is variously contrived. That chiefly used in Europe is made by drawing any number of parallel lines at the distance of two diameters of one of the counters used in the calculation. A counter placed on the lowest line signifies 1; on the 2d, 10; on the 3d, 100; on the 4th, 1000, &c. In the intermediate spaces, the same counters are estimated at one half of the value of the line immediately superior, viz. between the 1st and 2d, 5; between the 2d and 3d, 50; &c. See the figure on Plate 1. where the same number, 1788 for example, is represented under both divisions by different dispositions of the counters.

ABACUS is also used by modern writers for a table of numbers readily cast up, to expedite the operations of arithmetic. In this sense we have Abaci, or multiples, of division.

Chiefly ABACUS. See SWANPAK.

ABACUS Pythagoricus, the common multiplication table, so called from its being invented by Pythagoras. Abacus Logiformus, is a rectangular triangle, whose sides, forming the right angle, contain the numbers from 1 to 60; and its area, the product of each two of the numbers perpendicularly opposite. This is also called a formula of factors, or in turn of the counters.

Abacuss or Palmula, in the ancient mufeum, denote the machinery, whereby the strings of Polyplectra, or instruments of many strings, were struck with a plectrum made of quills.

ABACUS Harmonicus, is used by Kircher for the structure and disposition of the keys of a musical instrument, whether to be touched with the hands or the feet.

ABACUS Major, in metallurgic operations, the name of a trough used in the mines, wherein the ore is washed.

ABADDON, is the name which St John in the Revelation gives to the king of the locusts, the angel of the bottomless pit. The inspired writer says, this word is Hebrew, and in Greek signifies Apollyon, i.e. a destroyer. That angel-king is thought to be Satan or the devil; but Mr le Clerc thinks, with Mr. Hammond, that by the locusts which came out of the abyss, may be understood the zealous and robbers, who miserably afflicted the land of Judea, and laid it in a manner waste before Jerusalem was taken by the Romans; and that Abaddon, the king of the locusts, may be John of Gischala, who having treacherously left that town a little before it was surrendered to Titus, came to Jerusalem, where he soon headed part of the zealots, who acknowledged him as their king, whilst the rest would not submit to him. This subdivision of the zealot party brought a thousand calamities on the Jews.

ABADIR, a title which the Carthaginians gave to gods of the first order. In the Roman mythology, it is the name of a flower, which Saturn swallowed, by the contrivance of his wife Ops, believing it to be his new-born son Jupiter: hence it ridiculously became the object of religious worship.

ABÆ, or ABA (anc. geog.) a town of Phocis in Greece, near Helicon; famous for an oracle of Palmute, or rather over a basket.

ABALABA, the ancient name of APALLABA, the ancient name of Apallaba, a town of Phocis in Greece, near Helicon; famous for an oracle of Palmute, or rather over a basket.

ABALAK, a town of Siberia, two miles from Tobolik. E. Long. 64. 10. N. Lat. 57. 1.

ABALIENATION, in law, the act of transferring one man's property to another.

ABALLABA, the ancient name of Apallaba, a town in Wemoreiland, remarkable only for its antiquity, having been a Roman station. W. Long. 4. N. Lat. 55. 38.

ABALUS, (anc. geog.), supposing by the ancients to be an island in the German ocean, called by Timaeus Bafilia, and by Xenophon Lampacenus Battia; now the peninsula of Scandinavia. Here, according to Pliny, some imagined that amber dropped from the trees.
ABANA, or AMANA (anc. geog.), a river of Phocinia, which, rising from Mount Hermon, washed the fourth and west sides of Damascus, and falls into the Phocinian sea to the north of Tripolis, called Chyforbeas by the Greeks.

ABANGA. See ADY.

ABANO, a town of the Padaneo, in the republic of Venice, famous among the ancients for its hot baths. ABAIITES, a people who came originally from Thrace, and settled in Phoccea, a country of Greece, where they built a town which they called Aha, after the name of Abas their leader; and, if we may credit some ancient authors, the Abantes went afterwards into the island Eubea, now called Negropont; others say the Abantes of Eubea came from Athens. The Abantes were a very warlike people, closing with their enemies, and fighting hand to hand.

ABANTIAS, or ABANTIS (anc. geog.), a name of the island Eubea in the Egean sea, extending along the coast of Greece, from the promontory Sannium of Attica to Thessaly, and separated from Boeotia by a narrow strait called Euripus. From its length the island was formerly called Usa; afterwards Abantias, or Abantis, from the Abantes, a people originally of Thrace, called by Homer omothes Eubeans, from wearing their hair long behind, having in a battle experienced the inconvenience of wearing long hair before. From cutting their hair before, they were called Curetes.

ABAPTISTON, in surgery, the perforating part of the instrument called a trepan.

ABARA, a town in the Greater Armenia, under the dominion of the Turks; it is often the residence of the archbishop of Nakivan. E. Long. 46. 25. N. Lat. 39. 45.

ABARANE, a town of Asia, in Grand Armenia, belonging to the Turks: it is seated on the river Alinanga. E. Long. 46. 30. N. Lat. 39. 50.

ABARCA, an ancient kind of shoe used in Spain for passing the mountains with. It was made of raw hides, and bound with cords, which secured the feet of travellers against the snow.

ABARIM, high mountains of steep ascent, separating the country of the Ammonites and Moabites from the land of Canaan, where Moses died. According to Josephus, they stood opposite to the territory of Jericho, and were the last station but one of the Israelites coming from Egypt. Nebah and Pilgah were parts of these mountains.

ABARIS, the Hyperborean; a celebrated sage of antiquity, whose history and travels have been the subject of much learned discussion. Such a number of fabulous stories were told of him, that Herodotus himself seems to have been at a loss to relate them. He tells us only, that this Barbarian was said to have travelled with an arrow, and to have taken no food; but this does not acquit us with the marvellous properties which were attributed to that arrow; nor that it had been given him by the Hyperborean Apollo. With regard to the occasion of his leaving his native country, Heparion tells us, that the whole earth being infested with a deadly plague, Apollo, upon being consulted, gave no other answer, than that the Athenians should offer up prayers in behalf of all other nations: upon which several countries deputed ambassadors to Athens, among whom was Abaris the Hyperborean. In this journey he renewed the alliance between his countrymen and the inhabitants of the island of Debris. It appears that he also went to Lacedaemon; since, according to some writers, he there built a temple, consecrated to Proserpine the Sibyl. It is asserted, that he was capable of foretelling earthquakes, driving away plagues, laying forests, &c. He wrote several books, Porphyry as Suidas informs us, viz. Apollo's arrival into the in Pileus-country of the Hyperboreans; The megalops of the river Hebrus; Sainia, or the Generation of the Gods; Ahyger. Under the word collection of oracles; &c. Herminus the sophist applied him for speaking pure Greek; which attainment will be no matter of wonder to such as consider the ancient intercourse there was between the Greeks and Hyperboreans. If the Hebrides, or Western Island of Scotland (says Mr Tolland), were the Hyperboreans of Diodorus, then the celebrated Abaris was of that country; and likewise a Druid, belonging to the Turks: for we may credit the distinction of the infular Hyperboreans, makes him a Scythian; as do some others, milled by the fame vulgar error; though Diodorus has truly fixed his country lib. iii. in an island, and not on the continent. Indeed, the fictions and mistakes concerning our Abaris are infinite: however, it is by all agreed that he travelled quite over Greece, and from thence into Italy, where he converted familiarly with Pythagoras, who favoured him beyond all his disciples, by instructing him in his doctrines (especially his thoughts of nature), in a planter and more compendious method than he did any other. This distinction could not but be very advantageous to Abaris. The Hyperborean, in return, presented the Samian, as though he equalled Apollo himself in wisdom, with the sacred arrow, on which the Greeks have fabulously related, that he fat astride, and flew himself upon, through the air, over rivers and lakes, forests and mountains, in like manner as the vulgar till belief, particularly those of the Hebrides, that wizards and witches fly whithersoever they please on their broomsticks. The orator Hemius abovementioned, though one of those who, from the equivocal sense of the word Hyperborean, seems to have mistaken Abaris for a Scythian, yet describes his person accurately, and gives him a very noble character. "They relate (says he) that Abaris the sage was by nation a Hyperborean, "appeared a Grecian in speech, and resembled a Scythan, after he was accustomed to fortune, and having every thingYiiopyli, and Hyperboreans of Diodorus, then the celebrated Abaris was of that country; and likewise a Druid, belonging to the Turks: for we may credit the distinction of the infular Hyperboreans, makes him a Scythian; as do some others, milled by the fame vulgar error; though Diodorus has truly fixed his country lib. iii. in an island, and not on the continent. Indeed, the fictions and mistakes concerning our Abaris are infinite: however, it is by all agreed that he travelled quite over Greece, and from thence into Italy, where he converted familiarly with Pythagoras, who favoured him beyond all his disciples, by instructing him in his doctrines (especially his thoughts of nature), in a planter and more compendious method than he did any other. 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* Jamblichi
* Vita Pythag.
* Ptolemy
* Lib. iv.
* ap. 36.
* Under the word Acasis.
nations, about affairs no less arduous than important. As if we further attentively consider his moderation in eating, drinking, and the use of all those things which our natural appetites incessantly crave; joining the candour and simplicity of his manners with the fidelity and wisdom of his answers, all which we find sufficiently attested: it must be owned, that the world at that time had few to compare with Abaris.

ABARTICULATION, in anatomy, a species of articulation admitting of a manifest motion; called also Diarthrotic, and Dearticulation, to distinguish it from that fort of articulation which admits of a very obscure motion, and is called Synarthrosis.

ABAS, a weight used in Peria for weighing pearls. It is one-eighth less than the European carat.

Abas, in the heathen mythology, was the son of Hypothon and Meganira, who entertained Ceres, and to her presented a cup, on which he became a newt or Hypothoon and Meganira, who entertained Ceres, and Diarthrotis, and Dearticulation, to distinguish it from that of articulation which admits of a very obscure motion, and is called Synarthrosis.

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ABASCA, or Abacas, a country in Asia, tributary to the Turks, situated on the coast of the Black Sea. The people are poor, thievish, and treacherous, infomuch that there is no trading with them without the utmost caution. Their commodities are furs, buck and tigger skins, linen yarn, boxwood, and bees-wax: but their greatest traffic is in felling their own children, and even one another, to the Turks; infomuch that they live in perpetual distress. They are deftitute of many necessaries of life, and have nothing among them that can be called a town; though we find Anacopia, Dundar, and Czernorok, mentioned in the maps. They have the name of Christians; but having nothing left but the name, any more than the Mingrelsians their northern neighbours. The men are robust and active, and the women are fair and beautiful; on which account the Turks have given the value for the purchase which they pretend from among them. Their customs are full as much the same as tho' of the Mingrelsians; which see E. Long. from 39 to 43. N. Lat. from 43 to 45.

ABASCUS, a river of Asia Minor, which, rising from Mount Cucanost, falls into the Euxine, between Pityus to the east, and Nisia to the west.

ABASITIS (anc. geog.), a tract of Asia Minor, in which was situated the city of Cacea.

ABASSI, or Abas, a silver coin current in Persia, equivalent in value to a French livre, or ten times the value of a penny Sterling. It took its name from Schah Abbas II, king of Persia, under whom it was struck.

ABASSUS (anc. geog.), a town of the Greater Phrygia, on the confines of the Toliellozagi, a people of Galatia in Asia.

ABATAMENTUM, in law, is an entry to lands by interpolation, i.e. when a person dies seised, and another who has no right enters before the heir.

To ABATE, (from the French abbatre, to pull down, overthrow, demolish, batter down, or destroy), a term used by the writers of the English common-law, both in the active and negative sense; as, To abate a causu, is to beat it down. To abate a writ, is, by some exception, to defeat or overthrow it. A stranger abateth; that is, entereth upon a house or land void by the death of him that last poiseffed it, before the heir takes possession; and so keepeth him out: wherefore, as he that puttheth out him in possession is faid to defeize, so he that keepeth in between the former poifeessor and his heir is faid to abate. In the name of the demandant thus: The writ of the demandant shall abate; that is, shall be disabled, frustrated or overthrown. The appeal abateth by covin; that is, the accusatjon is defeated by deceit.

ABATE, in the manage, implies the performing any downward motion properly. Thus a horse is faid to abate to take down his curves, when he puts both his hind legs to the ground at once, and observes the same exactness in all the times.

ABATEMENT, in commerce, a term used for a prohibition of trade to all French merchants in the ports of the Levant who will not stand to their bargains, or refuse to pay their debts. It is a sentence of the French conful, which must be taken off before they can sue any person for the payment of their debts.

ABATEMENT, in heraldry, an accidental figure supposed to have been added to coats of arms, in order to denote some dishonourable demeanour or infamy, whereby the dignity of coat-armour was rendered of less esteem. See HERALDRY.

ABATEMENT, in law. See To ABATE.

ABATEMENT, in the customs, an allowance made upon the duty of goods, when the quantum damas is determined by the judgment of two merchants upon oath, and ascertained by a certificate from the surveyor and land-waiter.

ABATIS, an ancient term for an officer of the stables.

ABATON, an erection at Rhodes, as a fence to the trophy of Artemis, queen of Haliacarmathius, Coos, &c. raised in memory of her victory over the Rhodians; or rather as a screen to conceal the disgrace of the Rhodians from the eyes of the world, the efficaciou or destroying the trophy being with them a point of religion.

ABATOR, in law, a term applied to a person who enters to a house or lands void by the death of the last poiseessor, before the true heir.

ABATOS (anc.geog.), an island in the lake Moeris, formerly
ABB [7] ABB

ABBAS, formerly famous for its papyrus. It was the burial-place of Oiris.

ABBAY, in botany a synonym of the Adansonia.

ABB, a term; among clothiers, applied to the yarn of a weaver's warp. They say also Ab, or Abbot, in the same sense.

ABBAS a term; among clothiers, Ab, and Chaldee languages, and, figuratively, a superior, or the title which he bore before the bishop of Rome. It is a Jewish title of honour given to certain rabbins called Tannaim; and it is also particularly used by some writers of the middle age, for the superior of a monastery, usually called Abbot.

ABBADIE (James), an eminent Protestant divine, born at Nay in Bern in 1654; first educated there under the famous John la Placeette, and afterward at the university of Sedan. From thence he went to Holland and Germany, and was minister in the French church of Berlin. He left that place in 1690; came into England; was sometime minister in the French church in the Savoy, London; and was made dean of Killalow in Ireland. He died at St Mary le Bonne near London, in 1727, aged 73. He was strongly attached to the cause of King William, as appears in his elaborate defence of the revolution, and his history of the afflication-plot. He had great natural abilities, which he improved by true and useful learning. He was a most zealous defender of the primitive doctrine of the Protestants, as appears by his writings; and that strong nervous eloquence, for which he was so remarkable, enabling him to enforce the doctrines of his profession, from the pulpit with great spirit and energy. He published several works in French that were much esteemed; the principal of which are, A Treatise on the Truth of the Christian Religion; The Art of Knowing one's Self; A Defence of the British Nation; The Deity of Jesus Christ essential to the Christian Religion; The History of the last conspiracy in England, written by order of King William III.; and The Triumph of Providence and Religion, or the opening the Seven Seals by the Son of God.

ABBAS, son of Abdalmohleb, and Mahomet's uncle, opposed his nephew with all his power, esteeming him an impostor and infidel; but in the second year of the Hegira, being overcome and made a prisoner at the battle of Badr in 623, a great ranfom being demanded for him, he represented to Mahomet, that his paying it would reduce him to poverty, which would redound to the dishonour of the family. But Mahomet having been informed of Abbas's having sequestered large sums of money, aed them after the purges of gold he had left in his mother's custody at Mecca. Abbas, upon this, conceiving him to be really a prophet, embraced his new religion; became one of his principal captains: and saved his life when in eminent danger at the battle of Henaia, against the Thakifites, soon after the reduction of Mecca. But besides being a great commander, Abbas was a famous doctor of the Moslem law, in whose lectures upon every chapter of the Koran, as his nephew pretended to receive them one by one from heaven. He died in 652, and his memory is held in the highest veneration among the Moslems to this day.

Abul Abbas, son of Safiah, was proclaimed khali; and in him began the Dynasty of the Abbassides, who possessed the khilifate for 524 years; and there were 37 khilifs of this race who succeeded one another without interruption.

ABBIE, in a monastic sense, the same with Abbott.

ABBIE, in a modern sense, is the name of a curious popular character in France, very much mentioned, but very little known, in Britain. The term is not to be rendered in our language, as the existence of the being which it designates is posterior to the reformation, and no such character was known among the Romanists till about a century and a half ago.

Abbés, according to the strictest definition, are persons who have not yet obtained any specific or fixed settlement in church or state, but most heartily wish for and would accept of either, just as it may happen. In the mean while, their privileges are many. They are admissible in all companies, and no degradation to the best, notwithstanding they are sometimes found in the worst. Their drees is rather that of an academic, of a professor scholar, than of an ecclesiastic; and, never varying in colour, is no incumbrance on the pocket. These abbés are variously numerous, and no less useful. They are, in colleges, the instructors of youth; in private families, the tutors of young gentlemen; and many procure a decent livelihood by their literary and witty compositions of all kinds, from the profoundest philosophy to the most airy romances. They are, in short, a body of men who possess a fund of universal talents and learning, and are incessantly employed in the cultivation of every various branch of literature and ingenuity. No subject whatever escapes them; serious or gay, solid or transitory, sacred or profane, all pay tribute to their researches; and as they are conversant in the lowest as well as the highest topics, their fame is equally great in the learned and in the scribbling world. A distinguishing part of their character, too, whether we shall but slightly touch on is their devotion to the fair sex; whose favourites, in return, they have the honour of being in the most estimable degree; the wit and smartness for which they are usually remarkable, being just the very things that suit the French ladies. In fine, these abbés are sought after by most people, on various accounts; as they are equally men of business and pleasure, not less expert in the most serious transactions, than fond of enjoying their share in whatever occupies the gay world. Hence they diligently frequent all public spectacles, which are thought incomplete without them; as they compose the most intelligent part of the company, and are the most weighty approvers or condemners of what passes in almost all places.

ABBESS, the superior of an abbey or convent of nuns. The abbés has the same rights and authority over her nuns that the abbés regular have over their monks. The sex indeed does not allow her to perform the spiritual functions annexed to the priesthood, wherewith the abbés is usually invested; but there are influences of some abbés who have a right or rather a privilege,
ABB [8] ABB

ABBAY, a monastery, or religious house, governed by a superior under the title of abbot or abbess.

Abbeys differ from priories, in that the former are under the direction of an abbot, and the others of a prior: but abbot and prior (we mean a prior conventual) are much the same thing, differing in little but the name.

Fauchet observes, that in the early days of the French monarchy, dukes and counts were called abbots, and duchies and counties abbey. Even some of their kings are mentioned in history under the title of abbots. Philip I. Louis VI. and afterwards the dukes of Orleans, are called abbots of the monastery of St. Agnan. The dukes of Aquitaine were called abbots of the monastery of St. Hilary, at Ponsiflie; and the ears of Anjou, of St. Aubin, &c.

Monasteries were at first nothing more than religious houses, whither persons retired from the battle of the world to spend their time in solitude and devotion. But they soon degenerated from their original institution, and procured large privileges, exemptions, and riches. They prevailed greatly in Britain before the reformation; particularly in England; and as they increased in riches, so the state became poor; for the lands, which these regulars possessed were in mortua manu, i.e. could never revert to the lords who gave them. This inconvenience gave rise to the statutes against gifts in mortmain, which prohibited donations to religious houses: and Lord Coke tells us, that several lords, at their creation, had a clause in their grant, that the donor might give or sell his land to whom he would (exceptis viris religiosis & judaeis) excepting monks and Jews.

The places were wholly abolished in England at the time of the Reformation; Henry VIII. having first appointed visitors to inspect into the lives of the monks and nuns, which were found in some places very disorderly: upon which, the abbots, perceiving their dissolution unavoidable, were induced to resign their houses to the king, who by that means became invested with the abbey-lands: these were afterwards granted to different persons, whose dependents enjoy them to this day: they were then valued at 2,853,000l. per annum; an immense sum in those days.

Though the suppression of religious houses, even considered in a political light only, was of a very great national benefit, it must be owned, that at the time they flourished, they were not entirely useless. Abbeys or monasteries were then the repositories, as well as the seminaries, of learning; many valuable books and national records, as well as private evidences, have been preserved in their libraries; the only places wherein they could have been safely lodged in those turbulent times. Many of these, which had escaped the ravages of the Danes, were destroyed with more than Gothic barbarity at the dissolution of the abbeys. These ravages are pathetically lamented by John Bale, in his Declaration upon Le- land's Journal 1549. "Coveteousness," says he, "was at that time so high, that private commodity, that public wealth, in that most necessary and of repute, was not any where regarded. A number of them which purchased the superstitious mantles, reserved of the library-books, some to serve their jacks, some to scour the candlesticks, and some to rub their boots; some they sold to the grocer and soap-feller; and some they sent over sea to the book-binders, not in small numbers, but in whole ships full; yea, the universities of this realm are not clear of fo detestable a fact. I know a merchant that bought the contents of two noble libraries for 40s. price; a shame it is to be spoken! This fluff hath he occupied instead of gray paper, by the space of more than these ten years, and yet he hath stored enough for as many years to come. I shall judge this to be true, and utter it with heaviness, that neither the Britons under the Romans and Saxons, nor yet the English people under the Danes and Normans, had ever such damage of their learned monuments as we have seen in our time."

In these days every abbey had at least one person whose office it was to instruct youth; and the historians of this country are chiefly beholden to the monks for the knowledge they have of former national events. In these houses the arts of painting, architecture, and printing, were cultivated. The religious houses also were hospitals for the sick and poor; affording like-wise entertainment to travellers at a time when there were no inns. In them the nobility and gentry who were heirs to their founders could provide for a certain number of ancient and faithful servants, by procuring them cordes, or stated allowances of meal, drink, and clothes. They were likewise an asylum for aged and indigent persons of good family. The neighbouring places were also greatly benefited by the fair procure for them, and by their exemption from forest-laws; add to which, that the monastic ezates were generally let at very easy rents, the fines given at renewals included.

ABBEYBOYLE, a town of Ireland, in the county of Roscommon, and province of Connaught. W. Long. 8. 32. N. Lat. 56. 44. It is remarkable for an old abbey.
ABBET, or Abbate, the superior of a monastery of monks erected into an abbey or prelacy.

The name Abbet is originally Hebrow, where it signifies father. The Jews call father, in their language, Ab; whence the Chaldeans and Syrians formed Abba, thence the Greeks Ἀβας, which the Latins retained, Abbat; and hence our Abbot, the French Abbé, &c. St Mark and St Paul use the Syriac Abba in their Greek, by reason it was then commonly known in the synagogues and the primitive assemblies of the Christians: adding to it, by way of interpretation, the word father, Ἀβας ἀπατός, *Abba, father; †q. d. Abba, that is to say, Father. But the name Ab, or Abbs, which was at first a term of tenderness and affection in the Hebrew and Chaldee, became at length a title of dignity and honour: The Jewish doctors affected it; and one of their most ancient books, containing the sayings or apophthegms of divers of them, is intitled Pirke Abbat, or Avoth; i.e. Chapters of the Fathers. It was in allusion to this affection, that Jesus Christ forbade his disciples to call any man their father on earth; which word St Jerome turns against the superiors of the monasteries of his time, for affuming the title of Abbots, or Fathers.

The name Abbet, then, appears as old as the institution of monks itself. The governors of the primitive monasteries assumed indifferently the titles Abbots, Abbates, and Archimandrites*. They were really distinguished from the clergy; though frequently confounded with them, because a degree above laymen.

In those early days, the abbots were subject to the bishops and the ordinary pastors. Their monasteries being remote from cities, built in the farthest solitudes, they had no share in ecclesiastical affairs. They went on Sundays to the parish-church with the rest of the people; or, if they were too remote, a priest was sent them to administer the sacraments; till at length they were allowed to have priests of their own body. The abbots or archimandrites himself were priests, but his function extended no farther than to the spiritual assistance of his monastery; and he remained still in obedience to the bishop. There being among the abbots several persons of learning, they made a vigorous opposition to the rising heresies of those times; which oft occasioned the bishops to call them out of their deserts, and fix them among the outskirts of cities, and at length in the cities themselves: from which area their degeneracy is to be dated. The abbots, now, soon wore off their former plainness and simplicity, and began to be looked on as a sort of little prelates. They affected being independent of the bishops; and became so insupportable, that some severe laws were made against them at the council of Chalcedon; this notwithstanding, in time many of them carried the point of independence, and got the appellation of lords, with other badges of the episcopate, particularly the mitre. Hence arose new species of distinctions between the abbots. Thence were termedmitred abbots, who were privileged to wear the mitre, and exercise episcopal authority within their respective precincts, being exempted from the jurisdiction of the bishop. Others were called roistered abbots, from their bearing the crozier or pastoral staff. Others were styled solemnized or universal abbots, in imitation of the patriarch of Constantinople; while others were termed cardinal abbots, from their superiority over all other abbots. In Britain, the mitred abbots were lords of parliament; and called abbots-sovereign, and abbots-general, to distinguish them from the other abbots. And as there were lords abbots, there were also lords priors who had exempt jurisdiction, and were likewise lords of Parliament. Some reckoned 26 of these lords abbots and priors that sate in parliament. Sir Edward Coke says, that there were 27 parliamentary abbots and two priors. In the parliament 20 Rich. II. there were but 25 abbots and two priors: but in the summons to parliament anno 4 Ed. III. more are named.

At present, in the Roman-Catholic countries, the principal distinctions observed between the abbots are those of regular and recto-monastery. The former take the vow and wear the habit of their order; whereas the latter are seculars, though they are obliged by their bulls to take orders when of proper age.

Anciently the ceremony of assuming an abbot consisted in clothing him with the habit called cucullus, or cowl, putting the pastoral staff into his hand, and the shoes called pedales on his feet; but at present, it is only a simple benediction, improperly called, by some, consecration.

Abb in also a title given to others beside the superiors of monasteries: thus bishops, whose fees were formerly abbots, are called abbots; as are the superiors of some congregations of regular canons, particularly that of St Geneviève at Paris: and among the Genoese, the chief magistrate of their republic formerly bore the title of Abbat of the people. It was likewise usual, about the time of Charlemagne, for several lords to assume the title of count-abbots, abba comites; and that for no other reason, but because the superintendence of certain abbeys was committed to them.

ABBOT (George), archbishop of Canterbury, was born Oct. 29, 1562, at Guildford in Surrey. He went through his studies at Oxford, and in 1597 was chosen principal of University College. In 1599, he was installed dean of Winchester: the year following, he was chosen vice-chancellor of the university of Oxford, and a second time in 1603. In 1604, that translation of the bible now in use was begun by the direction of king James; and Dr. Abbot was the second of eight divines of Oxford, to whom the care of translating the whole New Testament (excepting the epistles) was committed. The year following, he was a third time vice-chancellor. In 1668, he went to Scotland with George Hume Earl of Dunbar, to affist in establishing an union between the Kirk of Scotland and the Church of England; and in this affair he behaved with so much address and moderation, that it laid the foundation of all his future preferment. For King James ever after paid great deference to his advice and counsel: and upon the death of Dr. Overton bishop of Lichfield and Coventry, he named Dr. Abbot for his successor, who was accordingly conftituted bishop of those two united sees in December 1629. About a month afterwards he was translated to the see of London, and on the second of November thereafter was raised to the archiepiscopal see.
It is not however improbable, that his extravagant adulation of his royal master, in which he went as far as any other court chaplain could do, contributed not a little to the acceleration of his preferment. In the preface to a pamphlet he published, the following specimen of ridiculous flattery occurs: Speaking of the king, he says, "whose life hath been so immaculate and unspoiled, &c. that even mankind itself, which leaves nothing unchristian, could never find true blemish in it, nor call probable aperfection on it."—Zealous of David, learned and wise, the Son of our age, religious as Josias; careful of spreading Christ's faith as Constantine the Great; just as Moses; undefiled in all his ways as Jeshophat and Hezekias; full of clemency as another Theodosius."—If Mr Walpole had seen this passage, he certainly would not have said, that "honest Abbot could not flatter,"

His great zeal for the Protestant Religion made him a strenuous promoter of the match between the Elector Palatine and the Princess Elizabeth; which was accordingly concluded and solemnized the 14th of February 1612, the archbishop performing the ceremony on a stage erected in the royal chapel. In the following year happened the famous case of divorce between the lady Francis Howard, daughter of the earl of Suffolk, and Robert earl of Essex: an affair which has been by many considered as one of the greatest blemishes in king James's reign; but the part therein acted by the archbishop added much to the reputation he had already acquired for incorruptible integrity. The matter was by the king referred to a court of delegates. The archbishop said plainly, that his Majesty was very desirous the lady should be divorced: but he was, in his own judgment, directly against the divorce. He laboured all he could to extricate himself from this difficulty, by having an end put to the cause by some other way than by sentence; but it was to no purpose: for those who drove on this affair, had got too great power to be restrained from bringing it to the conclusion the king desired. The archbishop prepared a speech, which he intended to have spoken against the nullity of the marriage, in the court at Lambeth; but he did not make use of it, because the king ordered the opinions to be given in few words. He contended, however, inflexible in his opinion against the divorce; and drew up his reasons, which the king thought fit to answer himself. It need scarce be added, that sentence was given in the lady's favour. In 1611, the king published a declaration, which he ordered to be read in all the churches, permitting servants and patiences on the Lord's day: this gave great uneasiness to the archbishop, who, happening to be at Croydon when it came hither, had the courage to forbid its being read. Being now in a declining state of health, the archbishop used in the summer to go to Hampshire for the sake of recreation; and being invited by lord Zouch to hunt in his park at Bramshill, he met there with the greatest misfortune that ever befell him; for he accidentally killed the game keeper by an arrow from a cross-bow which he shot at one of the deer. This accident threw him into a deep melancholy; and he ever afterwards kept a monthly fast on Tuesday, the day on which this fatal mischief happened, and he fettled an annuity of 200. on the vicar of Croydon, dow. There were several persons who took an advantage of this misfortune, to lessen him in the king's favour; but his Majesty said, "An angel might have miscarried in this fort." His enemies alleging that he had incurred an irregularity, and was thereby incapacitated for performing the office of a prince; the king directed a commissio to ten persons to inquire into this matter.

The result, however, was not satisfactory to his Graces' enemies: it being declared, that as the murder was involuntary, he had not forfeited his archiepiscopal character. The archbishop thenceforward fiel dom attended at the council, being chiefly hindered by his infirmities; but in the king's last illness he was sent for, and attended with great constancy till his Majesty expired on the 27th of March 1625. He performed the ceremony of the coronation of king Charles I. though very infirm and much troubled with the gout. He was never greatly in this king's favour; and the duke of Buckingham being his declared enemy, watched an opportunity of making him feel the weight of his displeasure. This he at last accomplished, upon the archbishop's refusing to licence a sermon, preached by Dr Sibthorpe to justify a loan which the king had demanded, and pregnant with principles which tended to overthrow the constitution. The archbishop was immediately after suspended from all his functions as primate; and they were exercised by certain bishops commissioned by the king, of whom Laud, the archbishop's enemy, and afterwards his successor, was one: while the only cause alligned for this procedure was, That the archbishop could not at that time personally attend those services which were otherwise proper for his congnisance and direction. He did not, however, remain long in this situation; for a parliament being absolutely necessary, his Grace was sent for, and restored to his authority and jurisdiction. But not proving friendly to certain rigorous measures adopted by the prevailing church-party, headed by Laud, whose power and interest at court were now very considerable, his presence became unwelcome there; so that upon the birth of the Prince of Wales, afterwards Charles II. Laud had the honour to baptize him, as dean of the chapel. The archbishop being worn out with cares and infirmities, died at Croydon, the 5th of August 1633, aged 71 years; and was buried at Guilford, the place of his nativity, and where he had endowed an hospital with lands to the amount of 300. per annum. A stately monument was erected over the grave, with the effigy of the archbishop in his robes.

He shewed himself, in most circumstances of his life, a man of great moderation to all parties; and was desirous that the clergy should attract the efficacy of the law by the sanctity of their manners, rather than claim it as due to their function. His notions and principles, however, not sifting the humour of some writers, have been drawn upon him many severe reflections; particularly, which is to be regretted, from the earl of Clarendon. But Dr Welwood has done more justice to his merit and abilities. He wrote several tracts upon various subjects; and, as already mentioned, translated part of the New Testament, with the rest of the Oxford version, 1611.

It is proper to observe here, that there was another writer of both his names, who flourished somewhat later. This George Abbot wrote A Paraphrase on the
ABBOT (Robert), elder brother to the former, and born at Guildford in 1560, went through his studies in Balacli college, Oxford. In 1582, he took his degree of master of arts, and soon became a celebrated preacher; and to this talent he chiefly owed his preferment. Upon his first sermon at Worcester, he was chosen lecturer in that city, and soon after rector of All-Saints in the same place. John Stanley, Esq.; happening to hear him preach at Paul's-cho'ps, was so pleased with him, that he immediately presented him to the rich living of Bingham in Nottinghamshire. In 1597, he took his degree of doctor in divinity: and, in the beginning of king James's reign, was appointed chaplain in ordinary Bingham in Nottinhamshire. In 1597, he was made prebendary of Normanfor: In 1609, he was appointed him regius professor of divinity at Oxford. November 1610, he was made prebendary of Normanford. The fame of his lectures became very great; and those which he gave upon the supreme power of kings against Bellarmine and Suarez, so much pleased his Majesty, that, when the see of Salisbury became vacant, he named him to that bishopric, and he was consecrated by his own brother at Lambeth, December 3, 1615. When he came to Salisbury, he found the cathedral running to decay, through the negligence and profaneness of the clergy belonging to it: however, he found means to draw five hundred pounds from the prebendaries, which he applied to the reparation of this church. He then gave himself up to the duties of his function with great diligence and affiduity, visiting his whole diocese in person, and preaching every Sunday whilst health would permit. But this was not long: for his sedentary life, and close application to study, brought upon him the gravel and stone, of which he died on the 2d of March 1618, in the fifty-eighth year of his age; having not filled the see quite two years and three months, and being one of the five bishops which Salisbury had in six years. He was buried opposite to the bishop's seat in the cathedral. Dr Fuller,* speaking of the two brothers, says, "that George was the more plausible preacher, Robert the greatest scholar; George the abler statesman, Robert the deepest divine: gravity did frown in George, and smile in Robert." He published several pieces: he also left behind him sundry manuscripts, which Dr Corbet made a present of to the Bodleian library.

ABBOTSBROXLEY, a town in Staffordshire, with a market on Tuesday. After the dissolution of the monasteries, it was given to the Lord Paget; and has since been called Paget's Broxley, and is so denominated in the county map. But it retains its old name in the king's books, and is a difcharged vicarage of 50l. clear yearly value. It likewise retains its old name with regard to the fairs. W. Long. i. 2. Lat. 52 45.

ABBOTSBURY, a small town in Dorsetshire, with a market on Thursday. W. Long. i. 17. Lat. 50. 42. Abbreviate 1. 2. Lat. 52 45.

ABBREVIAE of ADJUDICATIONS, in Scots law, an abridgment or abbreviation of a decree of adjudication, which is recorded in a register kept for that purpose.

ABBREVIATION, or ABBREVIATOR, a contrivance of a word or passage; made by dropping some of the letters, or by substituting certain marks or characters in their place.---Lawyers, physicians, &c. use abundance of abbreviations, partly for the sake of expeditiousness, partly for the sake of mystery; but of all people the Rabbins are the most remarkable for this practice, so that their writings are unintelligible without the Hebrew abbreviations. The Jewish authors and copyists do not content themselves with abbreviating words like the Greeks and Latins, by shortening some of the letters of the words; but they frequently take away all but the initial letters. They even frequently take the initials of several succeeding words, join them together, and, adding vowels to them, make a sort of barbarous word, representative of all those which they have thus abridged. Thus, Rabi Mofes ben Maimon, in their abbreviations is Rambam, &c.

ABBREVIATOR, in a general sense, a person who abridges any large book into a narrower compass.

ABBREVIATORS, a college of 72 persons in the chancery of Rome, who draw up the pope's briefs, and reduce petitions, when granted by him, into proper form for being converted in bulls.

ABUTALS, signify the buttiments or boundaries of lands towards any point. Limits were anciently distinguished by artificial hillocks, which were called boteines; and hence butting. In a description of the site of land, the sides on the breadth are more properly adjuncts, and these terminating the length are abutantes; which, in old surveys, were sometimes expressed by capitare, to head, whence abutments are now called head-lands.

ABCEDARY, or ABCEDARIAN, an epitome given to compositions, the parts of which are disposed in the order of the letters of the alphabet; thus we say, Abcedarian psalms, lamentations, hymns, &c.

ABCOURT, a town near St Germain, four leagues from Paris. Here is a brisk chalybeate water, impregnated with fixed air and the fossil alkali; and refculbling the waters of Spa and Ilmington.

ABDALLA, the son of Abdalmothib, was the father of the prophet Mahomet. Several other Arabians of eminence bore the same name.

ABDALMALEK, the son of Miryan, and the 5th Khalif of the race of the Omriades, furnished Rashid al-Hegmat, i.e. the thinner of a cone, because of his extreme avarice; as also Abdulzebed, because his breath was said to be so poisonous as to kill all the flies which rested on his face. Yet he surpassed all his predecessors in power and dominion: for in his reign the Indies were conquered in the east, and his armies penetrated Spain in the west: he likewise extended his empire toward the south, by making himself master of Medina and Mecca. He began his reign in the 67th of the hegira, A.D. 648; reigned 15 years; and was the son of his father, the Khalifate one after another.

B 2 ABDALMALEK.
ABDAMELEK (Ben Zohar), an eminent physician, commonly called by the Europeans AVINZCAR.

ABDAMOTILEB, or ABDEL MATELIEH, the son of Hathem, the father of Abdalla, and grandfather of Mahomet the prophet of the Mussulmans, was, it is said, of such wonderful comeliness and beauty, that all women who saw him became enamoured: which may have given occasion to that prophetic light, which, according to the Arabians, shone on the heads of him, his ancestors, and descendents; it being certain that they were very handsome and graceful men. He died when Mahomet, of whom he had taken peculiar care, was only 8 or 9 years old; aged, according to some, 110, and according to other writers 120.

ABDALONYMUS, or ABDOLONYMUS, (in classic history), of the royal family of Sidon, and descendent from king Cinyras, was contented to live in obscurity, and get his subsistence by cultivating a garden, while Strato was in possession of the crown of Sidon. Alexander the Great having deposed Strato, inquired whether any of the race of Cinyras was living, that he might set him on the throne. It was generally thought that the whole race was extinct; but at last Abdalonymus was thought of, and mentioned to Alexander; who immediately ordered some of his soldiers to fetch him. They found the good man at work, happy in his poverty, and entirely a stranger to the noise of arms, with which all Asia was at that time disturbed; and they could scarcely persuade him that they were in earnest. Alexander was convinced of his high descent by the dignity that appeared in his person; but was desirous of learning from him in what manner he bore his poverty.

"I will," said Abdalonymus, "I may bear my new condition as well: these hands have supplied my necessities: I have had nothing, and I have wanted nothing." This answer pleased Alexander so much, that, besides giving him all that was Strato's, he augmented his dominions, and gave him a large present out of the Persian spoils.

ABDALS, in the Eastern countries, a kind of saints supposed to be inspired to a degree of madness. The word comes, perhaps, from the Arabic, Abdallah, the servant of God. The Persians call them devotes khoda, similar to the Latins way of speaking of their prophets and sibyls, g. d. furentes deos, raging with the gods. They are often carried by excess of zeal, especially in the Indies, to run about the streets and kill all they meet of a different religion; of which travelers furnish many instances. The English call this, running a mitra, from the name of the infrument, a sort of pole, which they employ on theses desperate occasions. If they are killed, as it commonly happens, before they have done much mischief, they reckon it highly meritorious; and are esteemed, by the vulgar, martyrs for their faith.

ABDARA, or ADEERA, (anc. geog.) a town of Boeotia in Spain, a Phoenician colony; now ALDE, to the west of Almeria in the kingdom of Granada.

ABDERA, (anc. geog.) a maritime town of Thrace, not far from the mouth of the river Nessus, on the coast side. The foundation, according to Herodotus, was attempted to be laid by Timaeus the Cilician; but he was forced by the Thracians to quit the design. The Telians undertook it, and succeeded; setting there, in order to avoid the influx of the Persians. Several singularities are told of Aderos. The grapes of the country round it was so strong, that such horses as caed of it ran mad. In the reign of Caffander king of Macedonia, this city was besieged with frogs and rats, lib. xxvi. c. 8, that the inhabitants were forced to quit it for a time. The Abderites, or Abderians, were very much de-}
ABDOmen, in anatomy, is that part of the trunk of the body which lies between the thorax and the bottom of the pelvis. See Anatomy.

ABDOMINATE, or ABDOMINAL FISHES, constitute the IVth Order of the Fourth Class of Animals, in the Linnean System. See Zoology.

ABDUCTION, in logic, a kind of argumentation, by the Greeks called apagoge, wherein the greater extreme is evidently contained in the medium, but the medium not so evidently in the lesser extreme as not to require some farther medium or proof to make it appear. It is called abdiction, because, from the conclusion, it draws us on to prove the proposition assumed. Thus in the syllogism, "All whom God abdolves are free from sin; but God abdolves all who are in Christ; therefore all who are in Christ are free from sin,"—the major is evident; but the minor, or assumption, is not so evident without some other proposition to prove it, as, "God received full satisfaction for sin by the sufferings of Jesus Christ."

ABDICATION, in surgery, a species of fracture, wherein the broken parts of the bone recede from each other.

ABDUCTOR, or ABDUCENT, in anatomy, a name given to several of the muscles, on account of their tending to withdraw, open, or pull back the parts to which they belong.

ABEL, second son of Adam and Eve, was a shepherd. He offered to God some of the firstlings of his flock, at the same time that his brother Cain offered the fruits of the earth. God was pleased with Abel's oblation, but displeased with Cain's; so he exasperated the latter, that he rose up against his brother and killed him. These are the only circumstances Moses relates of him; though, were we to take notice of the several particulars to which curiosity has given birth on this occasion, they would run to a very great length. But this will not be expected. It is remarkable, that the Greek churches, who celebrate the feasts of every other patriarch and prophet, have not done the same honour to Abel. His name is not to be found in any catalogue of saints or martyrs till the 10th century; nor even in the new Roman Martyrology. However he is prayed to, with some other saints, in several Roman litanies said for persons who lie at the point of death.

Abel Keramitis, or Vincereus, beyond Jordan, in the country of the Ammonites, where Jephthah defeated them, seven miles distant from Philadelphia, abounding in vines, and hence the name. It was also called Abelos.

ABEL-Mehola, the country of the prophet Elisha, situated on this side Jordan, between the valley of Jezreel and the village Bethmaela in the plains of Jordan, where the Midianites were defeated by Gideon. Judges, vii. 22.
ABELIANS, or ABELIANS, of Abelontia, in church-history, a sect of heretics mentioned by St. Austin, which arose in the diocese of Hippo in Africa, and is supposed to have begun in the reign of Arcadius, and ended in that of Theodosius. Indeed it was not calculated for being of any long continuance. Tho' of this sect regulated marriage after the example of Abel; who, they pretended, was married, but died without ever having known his wife. They therefore allowed each man to marry one woman, but enjoined when a man and woman entered into this society, they adopted a boy and a girl, who were to inherit their sexes. From the name of this sect a colony of Chalcidians, the inhabitants were called Abelontians, or Abelontians, which gave rise to the name impotent, as the name imports, after in the British implying such a situation. It is a small but flourishing place, well built, and still increasing. The town has been in an improving state for the forty last years, and the number of inhabitants greatly augmented, which is owing to the introduction of manufactures. The number, at this time, is said to be about four thousand: these principally consist of weavers of coarse brown linens, and some sail-cloth; others are employed in making white and coloured threads; others are engaged in the spinning of the place, or in the necessary and common mechanic trades. The brown linens, or ofnaburghs, were manufactured here before any encouragement was given by Government, or the linen company erected at Edinburgh. It appears from the books of the flamp-office in this town, that seven or eight hundred thousand yards are annually made in the place, and a small district round. Besides this export and that of thread, much barley and some wheat is sent abroad. The foreign imports are flax, flax seed, and timber, from the Baltic. The coasting trade consists of coals from Borrowdounes, and lime from Lord Elgin's kilns in Fife. At this place, in default of a natural harbour, a tolerable artificial one of piers has been formed, where, at spring-tides, which rise here fifteen feet, ships of two hundred tons can come, and of eighty at neap-tides; but they must lie dry at low water. This port is of great antiquity: there is an agreement yet extant between the abbot and the burgess of Aberbrothick, in 1594, concerning the making of the harbour. Both parties were bound to contribute their proportions; but the largest fell to the share of the former, for which he was to receive an annual tax payable out of every rood of land lying within the borough. The glory of this place was the abbey, whose very ruins give some idea of its former magnificence. It was founded by William the Lion in 1178, and dedicated to the celebrated prince Thomas à Becket. The founder was buried here; but there are no remains of his tomb, or of any other, excepting that of a monk of the name of Alexander Nicol. The monks were of the Tyro-

Aberconway,
The harbour was long a great detriment to its trade; in 1593, but since greatly improved by the addition of a new quay, which was put in at the mouth of the river Don, over which is a bridge. The New Town, situated at the mouth of the river Don, is 67 feet wide at the bottom, and 34 feet high above the surface of the river, which at ebb-tide is deep enough for a ship of 200 tons, and above two miles in circumference.

The buildings (which are of granite from the neighbouring quarries) are generally four stories high, and have, for the most part, gardens behind them, which gives it a beautiful appearance. On the high-street is a large church, formerly belonging to the Franciscans. This church was begun by Bishop William Elphinston, and finished by Gavinus Dunbar, bishop of Aberdeen, about the year 1560. Bishop Dunbar is said to have built the bridge over the Dee, which consists of seven arches. In the middle of Cattle-street is an octagon building, with neat bas-reliefs of the kings of Scotland from James I. to James IV. This town-house makes a good figure, and has a handsome spire in the centre. The grammar-school is a low but neat building. Gordon's hospital is handsome; in front is a good statue of the founder: it maintains forty boys, who are apprenticed at proper ages. The infirmary is a large plain building, and sends out between eight and nine hundred cured patients annually. But the chief public building in the town is the Marischal-college, founded by George Keith earl of Marischal, in the year 1593; but since greatly augmented with additional buildings. There are about 140 students belonging to it. In both the Marischal and King's college the languages, mathematics, natural philosophy, divinity, &c. are taught by very able professors. The convents in Aberdeen were: One of Mathurines, of the order of the Trinity, founded by William the Lion, who died in 1214; another of Dominicans, by Alexander II.; a third of Observants, a building of great length in the middle of the city, founded by the citizens and Mr. Richard Vanes, &c.; and a fourth of Carmelites, or White Friars, founded by Philip de Arbutnot in 1350.

Aberdeen, including the Old Town, is supposed to contain 25,000 people. Its trade is considerable, but might be greatly extended by an attention to the white fisheries.

The harbour was long a great detriment to its trade, and occasioned the loss of many lives and much property. A stranger could never depend upon finding it as he left it; while vessels lay at anchor in the road till the tide should make, they have often been wrecked by storms.
forms which suddenly arose. It was very narrow at the mouth, having the easterly rocky point of the Grampian mountains on the south, and a flat sloping land on the north, extending along the coast for many miles. By the easterly and north-easterly flood the sand was driven in a long ridge across the harbour's mouth, and formed what was called the bar. Upon this bar the depth of water at low tide was sometimes not above three feet. Clearing away the sand, though but a partial and temporary remedy, was a matter of great expense to the community. If it was cleared one week so as to have five or six feet of water at ebb, a fresh storm next week undid all that had been done. The town at last came to a resolution of erecting a strong pier on the north side of the harbour. This pier is 1200 feet in length, and gradually increases in thickness and height as it approaches the sea, where the head or rounding is 60 feet diameter at the base, and the perpendicular elevation is 38 feet. The whole is built of granite, the most durable stone known; many of the outer lawns of houses are about three tons weight, with hewn beds. It was built under the direction of Mr. Snaiton; and the expense, amounting to above £17,000, is defrayed by doubling the harbour-dues, which are chiefly paid by the inhabitants. A little to the south of the bar, they have now a depth of 7 fathoms at low water; and at the harbour mouth, from eight to nine fathoms, where they had formerly but a few feet.

Aberdeen once enjoyed a good share of the tobacco trade. At present, its imports are from the Baltic, and a few merchants trade to the West Indies and North America. Its exports are stockings, thread, salmon, and oatmeal. The first is a most important article, as appears by the following state of it. For this manufacture, 20,800 pounds worth of wool is annually imported, and 1600 pounds worth of oil. Of this wool are annually made 69,333 dozen pairs of stockings; worth, at an average, 1 l. 10s. per dozen. These are the work of the country-people in almost all parts of this great county, who get 45. per dozen for spinning, and 14s. per dozen for knitting; so that there is annually paid them £5,500. There is, besides a large number of flocking, though not from the fine wool of the county. The thread manufacture is another considerable article, though trifling in comparison of the woollen. The salmon fisheries on the Dee and the Don are a good branch of trade. About 46 boats, and 130 men, are employed on the first; and, in some years, 167,000 lbs. of fish have been sent pickled to London, and about 930 barrels of salted fish exported to France, Italy, &c. — The fishery on the Don is far less considerable. The fish of this river are taken in creuses above the bridge; a practice contrary to the ancient laws of the kingdom, unless where the nature of the water rendered the net-fishery impracticable. The inhabitants likewise export considerable quantities of pickled pork, which they sold to the Dutch for victualing their East India ships and men of war; the Aberdeen pork having the reputation of being the best cured of any in Europe for keeping on long voyages.

It is however remarkable, (Mr. Knox observes), that there is not a single decked vessel fitted out from Aberdeen for the herring or white fisheries; here is now, an excellent harbour; an active people, conversant in Aberdeenshire trade, and possessed of capital, seated within six hours sailing of Long Forths, and two days sailing of the Shetland Isles. This inattention is the more extraordinary, as the exports of Aberdeen, though very considerable, do not balance the imports in value. The herring and white fisheries, therefore, if prosecuted with vigour, cured and dried with judgment, would not only extend the scale of exports, but also furnish the outward bound vessels with freights, and better remunerations for the foreign markets. The salmon of the Dee and Don are taken in great abundance, cured in the highest perfection, and greatly valued at the European markets. If the merchants, in addition to these, should also export the cargoes of 50 or 60 vessels constantly employed in the herring and white fisheries, the port of Aberdeen would in a few years become the most celebrated mart of fish now existing.

From a round hill at the west end of the city, flow two springs, one of pure water and the other of a quality resembling the German Spa. Aberdeen, with Aberbrothick, Brecbin, Monrofe, and Inverbervie, return one member to Parliament.

ABERDEENSHER, comprehends the districts of Mar, Garioch, Strathbogie, and the greater part of Buchan; and sends one member to Parliament. It is washed on the east and north by the ocean; and abounds in sea-ports, from whence there is a safe and ready passage to the Orkneys and Shetland Isles, the Greenland fisheries, Norway, and the regions round the Baltic, the German coast, Holland, Flanders, France. It is watered by numerous streams, all of them the reft of salmon, and which banks display the most extensive plantations as well as natural woods in Britain.

ABERDOUR, a small town in Fifeshire, Scotland, on the frith of Forth, about ten miles N. W. of Edinburgh. In old times it belonged to the Vipouts; in 1126 it was transferred to the Mortimers by marriage, and afterwards to the Douglasses. William, lord of Liddesdale, burned the Flower of chivalry. in the reign of David II., and also conveyed it to James Douglas, ancestor of the present noble owner the Earl of Morton. The monks of Aberdour were suppressed for a burial-place here from Allan de Mortimer, in the reign of Alexander III. The nuns, usually styled the poor Clare, had a convent at this place.

ABERFORD, a market-town in the west riding of Yorksire, stands in a bottom; and is about a mile long, and indifferently well built. It is near a Roman road, which is raised very high, and not far from the river Cock; between which and the town there is the foundation of an old castle still visible. It is 131 miles north-by-west from London. W. Long. 2° 45'. Lat. 55° 12'.

ABERGAVENNY, a large, populous, and flourishing town in Monmouthshire, seated at the confluence of the rivers Usk and Gavenny. It has a fine bridge over the Usk, consisting of fifteen arches; and being a great thoroughfare from the west part of Wales to Bath, Bristol, Gloucester, and other places, is well supplied with accommodations for travellers. It is surrounded with a wall, and had once a castle. It carries on a considerable trade in flannels, which are brought hither for sale from the other parts of the county.
ABERDEEN, county. It is 142 miles distant from London. W. ab.
aberration. Long. 2. 45. Lat. 51. 50. Abercawny appears to
have been the Gabinuna of Ammianus, and the town
of Ct. his Barrican.

ABERNETHY (John), an eminent dissenting minis-
ter, was the son of Mr John Abernethy a dissenting
minister in Coltraine, and was born on the 19th of Oc-
tober 1680. When about nine years of age, he was
separated from his parents, his father being obliged to
attend to public affairs in London; and his mother,
to shelter herself from the mad fury of the Irish rebels,
retiring to Derry, a relation who had him under his
charge, having no opportunity of conveying him to her,
took him with him to Scotland; by which means he
escaped the hardships he must have suffered at the siege
of Derry, where Mrs Abernethy lost all her other
children. He afterwards studied at the university of
Glasgow, till he took the degree of agregation at Antrim, where he continued
years. About the time of the Bangorian controver-
sy, escaped the hardships he must have
suffered; after his death a second volume was
published of his sermons on the Divine
attributes; after his death a second volume was
published by his friends; and these were succeeded by four
other volumes on different subjects: all of which have
been greatly admired.

ABERNETHY, a town in Strathern, a
district of Perthshire in Scotland. It is seated on the river Tay,
a little above the mouth of the Earn. It is said to have
been the seat of the Pictish kings; and was afterwards
the see of an archbishop, since transferred to St
Andrews. It is now greatly decayed.

ABERRATION, in astronomy, a small apparent
motion of the fixed stars discovered by the late Dr
Bradley. The discovery was made by accident in the
year 1725, when Mr Molyneux and Dr Bradley began
to observe the bright star in the head of Draco, mark-
ed γ by Bayer, as it passed near the zenith, with an
instrument made by Mr Graham, in order to discover the
parallax of the earth's annual orbit; and, after repeated
observations, they found this star, about the beginning
of March 1726, to be 20' more northern than at the
time of the first observation. It now indeed seemed to
have arrived at its utmost limit southward; because, in
several trials made about this time, no sensible difference
was observed in its situation. By the middle of April,
it appeared to be returning back again toward the
north; and, about the beginning of June, it passed at
the same distance from the zenith as it had done in De-
cember, when it was first observed; in September fol-
lowing, it appeared 29' more northerly than it was in
March, just the contrary way to what it ought to
appear by the annual parallax of the stars. This un-
expected phenomenon perplexed the observers very
much; and Mr Molyneux died before the true cause of it
was discovered. After this, Dr Bradley, with another Aberration
instruments more exact and accurately adapted to this
purpose, observed the same appearance not only in that
but in many other stars; and, by the great regularity
that appeared in a series of observations made in all
parts of the year, the Doctor was fully satisfied with re-
gard to the general laws of the phenomenon; and there-
fore endeavored to find out the cause of them. He
was already convinced, that the apparent motion of the
stars was not owing to a motion of the earth's axis.
The next thing that offered itself, was an aberration in
the direction of the plumb line, with which the in-
strument was constantly rectified; but this, upon trial,
proved insufficient. Then he had recourse to what re-
fraction might do; but here also nothing satisfactory
occurred. At last this acute astronomer found, that the
phenomena in question proceeded from the progressive
motion of light, and the earth's annual motion in its
orbit; for he perceived, that if light was propagated in
time, the apparent place of a fixed object would not
be the same when the eye is at rest, as when it is
moving in any other direction than that of the line par-
llel to the object, or moving through the eye and
object; and that, when the eye is moving in different directions, the apparent
place of the object would be different.

ABERRATION in optics, is used to denote that error
or deviation of the rays of light, when intercepted by a
lens or speculum, whereby they are hindered from
meeting or uniting in the same point. There are two
species of the aberrations of rays, distinguished by
their different causes: one arising from the figure of the
glass or speculum, the other from the unequal re-
frangibility of the rays of light. This last species is
sometimes called the Newtonian, from the name of its
discoverer. See Optics, vol. 2. 156, 173.

ABERYSWITH, a market-town of Cardig-
shire, in Wales, seated on the Rheid, near its confluence
with the Trefeth, where it falls into the sea. It is
a populous, rich town, and has a great trade in
lead, and a considerable fisheries of whiting, cod, and
herrings. It was formerly surrounded with walls, and
fortified with a castle; but both are now in ruins. Its
distance from London is 199 miles west-south-west.
W. Long. 4. 15. Lat. 52. 36.

ABESTA, the name of one of the sacred books
of the Persian magi, which they ascribe to their great
founder Zoroaster. The abesta is a commentary on two
of their religious books called Zend and Pazyru,
the three together including the whole system of
the Iganan, or worshippers of fire.

ABETTOR, a law-term, implying one who en-
courages another to the performance of some criminal
action, or who is art and part in the performance it-
self. Tresession is the only crime in which abettors are
excluded by law, every individual concerned being
considered as a principal. It is the same with Act-
and-part in the Scots law.

ABEX, a country in High Ethiopia, in Africa,
bordering on the Red Sea, by which it is bounded on
the east. It has Nobah or Sennar on the north; Senan
and Abyfsoh on the west; and Abyfinsic on the south.
Its principal towns are Suquem and Arkeko. It is
subject to the Turks, and has the name of the Begler-
berg of Habeleth. It is about five hundred miles in
length and one hundred in breadth, and is a wretched
C country;
country; for the heat here is almost insupportable, and the air is so unhealthy, that an European cannot stay long in it without the utmost hazard of his life. It is very mountainous, insomuch that there are many more wild beasts than men. There are forests, in which grow a great number of ebony trees.

ABEYANCE, in law, the expectancy of an estate. Thus if lands be left to one person for life, with reversion to another for years, the remainder for years is an abeyance till the death of the lessee.

ABGARUS, or ABGARUS, a name given to several of the kings of Edessa in Syria. The most celebrated of them is one who, it is said, was contemporary with Jesus Christ, and who having a diftermer in his feet, and hearing of Jesus's miraculous cures, requested him, by letter, to come and cure him. Eusebius*, who believed that his letter was genuine, and also an answer our Saviour is said to have returned to it, has translated them both from the Syriac, and were taken out of the archives of the city of Edessa. The first is as follows:—

"Abgarus, prince of Edessa, to Jesus the holy Saviour, who hath appeared in the flesh in the confines of Jerusalem, greeting. I have heard concerning thee, who art a god, and have returned to it, has translated them both from the Syriac, and were taken out of the archives of the city of Edessa. The first is as follows:—

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SCIRED, bordering on the Thracians and Ban-

SAMS: They were commended by Curtius for their love of justice, and by Ammianus for their concept of earthly things.

ABIMELECH, king of Gerar, a country of the Philistines, was contemporary with Abraham. This patriarch and his family being there, his wife Sarah, though 90 years of age, was not safe in it; for Abimelech carried her off, and was so enamoured of her, that he resolved to marry her. Abraham did not declare him to be Sarah's husband; but gave out she was his sister. But the king being warned in a dream, that she was married to a prophet, and that she should die if he did not restore her to Abraham, the king obeyed; at the same time reproving Abraham for his dissimulation; who thereupon, among other excuses, said she was really his sister, being born of the same father, tho' of a different mother. Abimelech afterwards gave considerable presents to Abraham; and a covenant, that of Beerheba, was entered into between them.——After the death of Abraham, which was caused by a famine in the neighbouring countries, Isaac his son also withdrew into Canaan; but Abimelech afterwards entered into a covenant with him.

ABIMELECH, the natural son of Gideon, by Drusilla, was killed at the age of 30 years by his concubine, her beauty forced her husband to declare her for his wife, who thereupon, among other excuses, said she was really his sister, being born of the same father, tho' of a different mother. Abimelech afterwards gave considerable presents to Abraham; and a covenant, that of Beerheba, was entered into between them.——After the death of Abraham, which was caused by a famine in the neighbouring countries, Isaac his son also withdrew into Canaan; but Abimelech afterwards entered into a covenant with him.

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ABL [20] ABR

Abjuration renouncing, disinclining, and denying upon oath, the Pretender to have any kind of right to the crown.

Abjuration of Heresy, the public recantation of any doctrine as false and wicked.

Ablation, or wearing a child from the breast. See Wounding.

Ablation, among the ancient gardeners, the name with which is called expelling by approach.

Ablation, a country of Great Tartary, the inhabitants of which, called Bichar or Bicharah, are subject to Ryllia, but that only for protection. It lies eastward of the river Iris, and extends five hundred leagues along the southern frontiers of Siberia.

Ablation, an old term in gardening, signifies the operations of removing the earth and burying the roots of trees in winter, to expose them more freely to the air, rains, snows, &c.

Ablation Court. See Perrot.

Ablative, in Grammar, the sixth case of Latin nouns which is formed from the fifth: "to take away." Frischlin also calls it the "comparative case;" or serving, among the Latins, for comparing, as well as taking away.

The ablative is opposite to the dative; the first expressing the action of taking away, and the latter that of giving.

In English, French, &c. there is no specific mark whereby to distinguish the ablative from other cases; and we only use the term in analogy to the Latin. Thus, in the two phrases, the magnitude of the city, and he spoke much of the city, we say, that of the city in the first is genitive, and in the latter ablative; because it would be so, if the two phrases were expressed in Latin.

The question concerning the Greek ablative has been the subject of a famous literary war between two great grammarians, Frischlin and Cruiis; the former of whom maintained, and the latter opposed the reality of it. The dispute still subsists among their respective followers. The chief reason adduced by the former is, that the Roman writers often joined Greek words with the Latin prepositions, which govern ablutive cases, as well as with nouns of the same case. To which their opponents reply, that the Latins, anciently had no ablative themselves; but instead thereof, made use, like the Greeks, of the dative case: till at length they formed an ablative, governed by prepositions, which were not put before the dative: that, at first, the two cases had always the same termination, as they still have in many instances; but that this was afterwards changed in certain words. It is no wonder then, that the Latins sometimes join prepositions which govern an ablative case, or nouns in the ablative case, with Greek datives, since they were originally the same; and that the Greek datives have the same effect as the Latin ablative.

Able, or ABL. (Thomas), chaplain to Queen Catherine confor to Henry the eighth, distinguished himself by his zeal in opposing the proceedings against that unfortunate princess for a divorce. For this purpose he wrote a piece entitled "Tractatus de non diffolvento Henri et Catharine matrimonio, i.e. A Treatise proving that the marriage of king Henry and queen Catherine ought not to be dissolved." But the title of the book, according to bishop Tanner, was Justitia Veritatis. He took the degree of Bachelor of Arts at Oxford on the 4th of July 1513, and that of Master of Arts on the 27th of July 1516. In 1524 he fell under a prosecution for being concerned in the affair of Elizabeth Barton, called the Holy Maid of Kent. This was an infamous impostor, forborne by the monks of some strange gesticulations, and to pretend to inspiration by the spirit of prophecy; and so well did he act her part, that some people of consequence gave credit to her; but being at last detected, she was condemned and executed, after discovering the names of her principal accomplices and instigators. On her account Able was accused of misprision of treason, by Stat. 25. Hen. VIII.; and being also one of those who denied the king's supremacy over the church, he was apprehended and imprisoned; during which time his confinement was so rigorous, that the keeper of Newgate was committed to Marshalsea prison for suffering him to go out upon bail. He was afterwards hanged, drawn, and quartered, at Smithfield in 1540. Bouchier gives him the character of a very learned man; and says, that he taught to teach the queen music and the learned languages.

Ablative, in Roman antiquity, a select body of soldiers chosen from among those called Extraordinary.

Ablegmina, in Roman antiquity, those choice parts of the entrails of victims which were offered in sacrifice to the gods. They were sprinkled with salt, and burnt upon the altar; the priests pouring some wine on them.

Abluents, in medicine, the same with diluters of Diluents.

Ablution, in a general sense, signifies the washing or purifying something with water.

Ablution, in a religious sense, a ceremony in use among the ancients, and still practised in several parts of the world: it consisted in washing the body, which was always done before sacrificing, or even entering their houses. Ablutions appear to be as old as any ceremonies, and external worship itself. Mosaic enjoined them; the heathens adopted them; and Mahomet and his followers have continued them; thus they have got footing among most nations, and make a considerable part of most established religions. The Egyptian priests had their diurnal and nocturnal ablutions: the Grecians their sprinklings: the Romans their lastrations and lavations: the Jews their washing of hands and feet, besides their baptisms. The ancient Christians had their ablutions before communion; which the Romish church still retain before their masses, sometimes after: the Syrians, Copts, &c. have their solemn washings on Good Friday: the Turks their greater and lighter ablutions; their Ghaft and Wodon, their Aman, Taharat, &c.

Abner, the son of Ner, father-in-law to Saul, and general of all his forces, who served him on all occasions with fidelity and courage. After the death of that prince, Abner set Ishbooth, Saul's son, on the throne. A war breaking out between the tribe of Judah who had elected David king, and Israel, Abner marched against that prince with the flower of his troops, but was defeated. Abner afterward, being disdained, went over to David, and disposed the chiefs of the army and the elders of Israel to declare for him; and was received by David with such testimonies of affection, as gave umbrage to Joab, who killed him traitorously.
ABONOA, now Årno, a long range of mountains in Germany, taking different names according to the different countries they run through. As about the river Maine, called the Odenwald, between Hesse and Frankfort, the Speich; and about the duchy of Wirtemberg, where the Danube takes its rise, called the Baar.

ABO, a maritime town in Sweden: it is the capital of the province of Finland, and lies upon the point where the gulfs of Bothnia and Finland unite. It is a good port; and is the seat of a bishop, suffragan of Upsal. It has an university, founded by queen Christina in 1640, and endowed with the same privileges as that of Upsal. There is also a school here, which was founded by Gustavus Adolphus, for 300 scholars.

The town is tolerably well built, and contains several brick buildings; but the generality are of wood painted red. The inhabitants export linen, corn, and planks. It lies 120 miles north-east from Stockholm.

L. Long. 21. 28. Lat. 60. 50.

ABOARD, the inside of a ship. Hence any person who enters a ship is said to go aboard: but when an enemy enters in the time of battle, he is said to board; a phrase which always implies hostility.—To fall aboard of, is to strike or encounter another ship when one or both are in motion, or to be driven upon a ship by the force of the wind and current.—Aboard main-tack, the order to draw the main-tack, i.e. the lower corner of the main-sail, down to the Chess-tree.

ABOLITION, implies the act of annihilating, destroying, making void, or reducing to nothing. In law, it signifies the repealing any law or statute.

ABOLL, a warm kind of garment, lined or doubled, worn by the Greeks and Romans, chiefly out of oxen, goats, of the fourth quality of this garment. The pallium, or cloak. The abomasus, or abominat.
The term Abortion, though so famous in antiquity, is used in modern geography only occasionally as an apppellative. It is given to the primitive inhabitants of a country, in contradistinction to colonies, or new races of people.

ABORTION, in midwifery, the exclusion of a foetus before it has acquired a sufficient degree of perfection to enable it to perform respiration and the other vital functions. See MIDWIFERY.

The practice of procuring abortions was prohibited by the ancient Greek legislators Solon and Lycurgus. Whether or not it was permitted among the Romans, is used in modern geography only occasionally as an apppellative.

There was a council by them called vifcera, over which was by them called vifcera, over which was by them called ufed in modern geography only occasionally as an apppellative.

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Moreover, the negative; and may be observed, that often all the powers of art prove ineffectual, and no less often do the consequences which they occasion, that the crime amounted to little more than the penalty had the same power to leave the ship's crew to prepare for tacking.

ABORTIVE CORN, a distemper of corn mentioned by M. Gillet, and fungicide to be occasioned by insects. It appears long before harvest, and may be known by a deformity of the stalk, the leaves, the ear, and even the grain.

ABORTIVE Vellum is made of the skin of an abortive calf.

ABOUKIR, a small town of Egypt, situate in the desert between Alexandria and Rosetta. It is the ancient Canopus, and is situated, according to Mr Savary, fix leagues from Pharos. Pliny says, from the testimonies of antiquity, that it was formerly an island: and its local appearance makes this credible; for the grounds around it are so low, that the sea still covers a part of them in the days of Strabo. The town is built upon a rock, which forms a handsome road for shipping, and is out of the reach of inundations. See CANOPUS.

ABOUT, the situation of a ship immediately after she has tacked, or changed her course by going about and standing on the other tack.—About ship! the order to the ship's crew to prepare for tacking.

ABOUTIGE, a town in Upper Egypt, on Africa, near the Nile where they make the best opium in all the Levant. It was formerly a large, but now is a mean place. N. Lat. 26° 30'.

ABRA, a silver coin struck in Poland, and worth about one shilling Sterling. It is current in several parts of Germany, Constantinople, Afracan, Smyrna, and Grand Cairo.

ABRABANELS, of ABRABANELS, or ABRAYANEL, (Isaac), a celebrated rabbi, descended from King David, and born at Lisbon A.D. 1437. He became counsellor to Alphonso V. king of Portugal, and afterwards to Ferdinand the Catholic; but in 1492 was obliged to leave Spain with the other Jews. In short, after residing at Naples, Corfu, and several other cities, he died at Venice in 1508, aged 71. Abrabanel passed for one of the most learned of the rabbis; and the Jews gave him the name of the Sage, the Prince, and the Great Politician. We have a commentary of his on all the Old Testament, which is pretty scarce: he there principally adheres to the literal sense; and his style is clear, but a little diffuse. His other works are: A Treatise on the Creation of the World; in which he refutes Aristotle, who imagined that the world was eternal: A Treatise on the explication of the prophecies relating to the Messiah, against the Christian: A book concerning articles of Faith; and some others lefts fought after. Though Abrabanel discourses his implacable a-version to Christianny in all his writings, yet he treats of Christians with politeness and good-manners in the common affairs of life.

ABRACADABRA, a magical word, recommended by Serenus Samonicus as an antidote against agues and several other illnesses. It was to be written upon a piece of paper as many times as the words contain letters, omitting the last letter of the former every time, as in the margin, and repeated in the same order: and then suffused about the neck by a linen thread. Abracadabra was the name of a god worshiped by the Syrians; so wearing his name was a sort of invocation of his aid: a practice which, though not more nefecity, yet was least ir- rationally, that is the equally heathenish practice, among those who call themselves Christians, of wearing various things, in expectation of their operating by a sympathy, whose parents were Ignorance and Superstition.

ABRAHAM, the father and stock whence the faithful sprung, was the son of Terah. He was descended from Noah by Shem, from whom he was nine degrees removed. Some fix his birth in the 130th year of Terah's age, but others place it in his father's 70th year. It is highly probable he was born in the city of Ur, in Chaldea, which he and his father left when they went
Abraham went to Canaan, where they remained till the death of Terah; after which, Abraham returned his first design of going to Palestine. The Scriptures mention the several places he lodged in Canaan, on his journeying into Egypt, where his wife was carried off from him; his going into Gerar, where Sarah was again taken from him, but restored as before; the victory he obtained over the four kings who had plundered Sodom; his compliance with his wife, who intimated that he should make use of her maid Hagar in order to raise up children; the covenant God made with him, sealed with the ceremony of circumcision; his obedience to the command of God, who ordered him to offer up his only son as a sacrifice, and how that bloody act was prevented; his marriage with Keturah; his death at the age of 175 years; and his interment at the cave of Macpelah, near the body of Sarah his first wife. It would be of little use to dwell long upon these particulars, since they are so well known. But tradition has supplied numberless others, the mention of one or two of which may not be unacceptable.

Many extraordinary particulars have been told relating to his conversion from idolatry. It is a pretty general opinion, that he sucked in the poison with his mother, and that his father being gone a journey, left him to fell the flames, excepting the man, brig were 365 heavens between the earth and it. Also no deity but the Geu efin.

Abraham is said to have been well skilled in many sciences, and to have wrote several books. Josephus tells us that he taught the Egyptians arithmetic and geometry; and, according to Eusebius and Aratianus, he instructed the Phoenicians, as well as the Egyptians, in astronomy. A work which treats of the creation has been long ascribed to him; it is mentioned in the Talmud, and the Rabbis Chana, and Hofciba used to read it on the eve before the sabbath. In the first ages of Christianity, according to St Epiphanius, there were sects called Sethinians. Some Jewish authors relate, that Abraham followed the fame trade with Terah for a considerable time. Maimonides says, that he was bred up in the religion of the Sabæans, who acknowledged no deity but the stars; that his reflections on the nature of the planets, his admiration of their motions, beauty, and order, made him conclude there must be a being superior to the machine of the universe, a being who created and governed it.

Looking to an old tradition, he did not renounce paganism till the 50th year of age. It is related, that his father being gone on a journey, left him to fell the flames, excepting the man, who pretended to be a pedlar, asked him how old he was, Abraham answered, "Fifty." "Wretch that thou art, (said the other,) for adoring at such an age, a being which is but a day old!" These words greatly confounded Abraham. Some time afterwards, a woman brought him some flour, that he might give it as food to the flames; "Upon which (said he), the god you see there, being the flousted, bade the others to pieces with that hatchet." Terah told him this was butting; for those idols had not the fene to act in this manner. Abraham retorted these words upon his father against the worshipping of such gods. Terah, hugging with his rafter, delivered up his son to the cognition of Nimrod, the sovereign of the country: who exhorted Abraham to worship the fire; and, upon his refusal, commanded him to be thrown into the midst of the flames: "Now let your God (said he) come and deliver you!" But (adds the tradition) Abraham came safe and sound out of the flames. This tradition is not of modern date, since it is told by St. Jerome; who seems to credit it in general, but disbelives that part of it which makes Terah so cruel as to be the informer against his own son. Perhaps the authority of the words of the tradition is given to the father in the form is mentioned above. It is the proper name of a city, and it also signifies a father. The Heretical son.

Abraham uttered the following words, which God says to Abraham (Gen. xv. 7): "Now the Lord that brought thee out of Ur of the Chaldees, imagine that he saved him from a great perfection, since he employed the very same words in the beginning of the decalogue to denote the deliverance from Egypt.

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ABRASION, is sometimes used among medicinal writers, for the effect of sharp corrosive medicines, or humours in wearing away the natural mucous which covers the membranes, and particularly those of the fo- 
mach and intestines. The word is composed of the Latin ab and rados to shave or scrape off.

ABRAVANNUS (anc. geog.) the name of a pro-
montory and river of Galloway, in Scotland, so called from the Celtic terms Ebor, signifying either the mouth of a river, or the confluence of two rivers, and Aboon, a river.

ABRAUM, in natural history, a name given by some writers to a species of red clay used in England by the cabinet makers, &c. to give a red colour to new mahogany wood. We have it from the file of Wight; but it is also found in Germany and Italy.

ABRASAS, an antique stone with the word abrassat engraven on it. They are of various sizes, and most of them as old as the third century. They are frequent in the cabinets of the curious; and a collection of them, as complete as possible, has been desired by several. There is a fine one in the abbey of St Geneviève, which has occasioned much speculation. Most of them seem to have come from Egypt; whence they are of some use for explaining the antiquities of that country. Sometimes they have no other inscription besides the word: but others have the names of saints, angels, or Jehovah himself annexed; though most usually the name of the Basildian god. Sometimes there is a re- 
presentation of Isis sitting on a liones, or apis, surrounded with stars; sometimes monstrous compositions of animals, obscene images, Phalli and ithyfalli. The graving is rarely good, but the word on the reverse is sometimes said to be in a more modern taste than the other. The characters are usually Greek, Hebrew, Coptic, or Hetnerian, and sometimes of a mongrel kind, invented, as it would seem, to render their meaning the more intractable. It is disputed whether the Vestal Virgins, or other granite obelisk mentioned by Gori, be abrassases.

ABREAST (a sea-term), side by side, or opposite to; a situation in which two or more ships lie, with their sides parallel to each other, and their heads equally advanced. This term more particularly regards the line of battle at sea, where, on different occasions of attack, retreat, or pursuit, the several squadrons or divisions of a fleet are obliged to vary their dispositions, and yet maintain a proper regularity by falling in right or curved lines. When the line is formed abreast, the whole squadron advances uniformly, the ships being equally distant from and parallel to each other, so that the length of each ship forms a right angle with the extent of the squadron or line abreast. The commander in chief is always stationed in the centre, and the second and third in command in the centre of their respective squadrons. Abreast, within the ship, implies on a line with the beam, or by the side of any object aboard; as, the frigate sprang a leak abreast of the main-hatch-way, i.e. on the same line with the main hatch-way, cutting the ship's length at right angles, in opposition to aove or abash the hatch-way. We discovered a fleet abreast of Bexley-head; i.e. off, or abreast, directly opposite to it.

ABRITTE, or Abrettine (anc. geog.), a di-
strict of Syria, in Asia. Hence the epithet Abretnus given to Jupiter (Strabo), whose priest was Ebon, formerly at the head of a gang of robbers, and who received many and great favours at the hands of Augustus, but afterwards went over to Augus. The people were called Abretti: inhabiting the country between Ancya of Phrygia, and the river Rhynidac.

ABRIDGEMENT, in literature, a term signify-
ing the reduction of a book into a smaller compass. The art of conveying much sentiment in few words, is the happiest talent an author can be possessed of. This talent is peculiarly necessary in the present state of literature; for many writers have acquired the dexterity of spreading a few critical thoughts over several hundred pages. When an author hits upon a thought that pleases him, he is apt to dwell upon it, to view it in different lights, to force it in improperly, or upon the lightest relations. Though this may be pleasant to the writers, it tires and vexes the reader. There is another great source of diffusion in composition. It is a capital object with an author, whatever be the sub-
ject, to give vent to all his thoughts. When he finds a proper place for any of them, he is peculiarly happy. But, rather than sacrifice a thought he is fond of, he forces it in by way of digression, or superfluous illuration. If none of these expedients answer his purpose, he has recourse to the margin, a very conven-
ient apartment for all manner of pedantry and imper-
tinenre. There is not an author, however correct, but is more or less faulty in this respect. An abridger, however, is not subject to these temptations. The thoughts are not his own; he views them in a cooler and less affectionate manner; he discovers an impropriety in some, a vanity in others, and a want of utility in many. His butifens, therefore, is to retrench superfluities, digressions, quotations, pedantry, &c. and to lay before the public only what is really useful. This is by no means an easy employment: To abridge some books, requires talents equal, if not superior, to those of the author. The facts, manner, spirit, and reafoning, must be preserved; nothing essential, either in argument or illuration ought to be omitted. The difculty of the task is the principal reason why we have so few good abridgements: Wynne's abridgment of Locke's Essay on the Human Understanding, is, per-
haps, the only unexceptionable one in our language. These observations relate solely to such abridgements as are designed for the public. But,

When a person wants to fet down the substance of any book, a shorter and less laborious method may be followed. It would be foreign to our plan to give ex-
amples of abridgements for the public: But as it may be useful, especially to young people, to know how to abridge books for their own use after giving a few di-
rections, we shall exhibit an example or two, or show what safe it may be done.

Read the book carefully; endeavour to learn the principal view of the author, attend to the arguments employed: When you have done so, you will generally find, that what the author uses as new or additional arguments, are in reality only collateral ones, or exten-
tions of the principal argument. Take a piece of
Abridging is peculiarly useful in taking the substance
Abridgments are brief summaries of texts.

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...paper or a common-place book, put down what the
author wants to prove, follow the argument or argu-
ments, and you have the substance of the book in a
few lines. For example,

In the Essay on Miracles, Mr Hume's design is to
prove, That miracles which have not been the imme-
diate objects of our senses, cannot reasonably be be-
lieved upon the testimony of others.

Now, his argument (for there happens to be but one)
is,

"That experience, which in some things is variable,
"in others uniform, is our only guide in reaoning
"concerning matters of fact. A variable experience
gives rise to probability only; an uniform experi-
ence amounts to a proof. Our belief of any fact
"from the testimony of eye-witnesses is derived from
"no other principle than our experience in the vera-
city of human testimony. If the fact attested be
"miraculous, here arises a contest of two opposite ex-
periences, or proof against proof. Now, a miracle
"is a violation of the laws of nature; and as a firm and
"unfavorable experience has established these laws, the
"proof against a miracle, from the very nature of the
"fact, is as complete as any argument from experi-
ence can possibly be imagined; and if so, it is an un-
"deniable consequence, that it cannot be furbombed by
"any proof whatever derived from human testimony."

In Dr Campbell's Dissertation on Miracles, the au-
thor's principal aim is to shew the fallacy of Mr Hume's
argument; which he has done most successfly by
another single argument, as follows:

"The evidence arising from human testimony is not
"solely derived from experience: on the contrary, te-
"limony hath a natural influence on belief antece-
dent to experience. The early and unlimited affer-
given to testimony by children gradually con-
as they advance in life: it is, therefore, more con-
fonant to truth, to lay, that our diSference in testimo-
ny is the result of experience, than that our faith in
"it has this foundation. Besides, the uniformity of
"experience, in favour of any fact, is not a proof a-
"gainst its being reversed in a particular instance.
"The evidence arising from the single testimony of a
"man of known veracity will go further to establish a
"belief in its being actually reversed: If his testimo-
"ny be confirmed by a few others of the same charac-
ter, we cannot withhold our assent to the truth of it.
"Now, though the operations of nature are governed
"by uniform laws, and though we have not the testi-
mony of our senses in favour of any violation of
"them; still, if in particular instances we have the
"testimony of thousands of our fellow-creatures, and
"those too, men of strict integrity, swayed by no mo-
tives of ambition or interest, and governed by the
"principles of common-fence, That they were actu-
"ally eye-witnesses of these violations, the constitu-
tion of our nature obliges us to believe them.

These two examples contain the substance of about
400 pages. Making private abridgements of this
kind has many advantages; it engages us to read with
accuracy and attention; it fixes the subject in our minds: and, if we should happen to forget, instead of
reading the book again, by glancing a few lines we are
not only in poifession of the chief arguments, but re-
call in a good measure the author's method and manner.

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In France, situated on an eminence in the south-west
of Normandy, Bar the best of B.students on the
Eng-

vL. 1.
and still is, their staple commodity: the flocks, after palling the whole summer in the fine pastures of the mountains, are driven for the winter into the warm plains of Puglia, and a few spots near their own coast, where the snow does not lie; there are no manufactures of woollens in the province, except two small ones where the snow does not lie; there are no of coarse cloth, and the greatest part of the wool is sent out unwrought. No silk is made here, though mulberry-trees would grow well in the low grounds.

Formerly the territory of Aquila furnished Italy almost exclusively with silk; but since the culture of that plant has been so much followed in Lombardy, it has fallen to nothing in Abruzzo. In the maritime tracks of the country the cultivation of liquorice has been increased of late years, but foreigners export the roots in their Sophistic pursuit to a similar climate, came, and disposed of them. The Greeks, who retained almost every other part of the kingdom under their dominion, never had any sway here. For this reason the Abruzzesi still bear a great resemblance to their northern progenitors or mailers: to this day, one may trace in them the same goodness of heart, but great indulgence, and repugnance to lively exertions; a fault that proceeds rather from a want of active virtue, than a disposition to wickedness. Hence it comes that in the provinces, where the proximity of the frontier almost infuses impurity, fewer atrocious and inhuman deeds are heard of than in other parts of the realm. Remnants of ancient northern customs existed here so late as the beginning of this century, and, among the mountaineers, very evident traces of the Frank and Teutonic languages may be discovered.

ABSALOM, the son of David by Maachah, was brother to Thamar, David's daughter, who was ravished by Amnon their eldest brother by another mother. Absalom waited two years for an opportunity of revenging the injury done to his father; and at last procured the assassination of Amnon at a feast which he had prepared for the king's sons. He took refuge with Talmi king of Gethin; and was no sooner restored to favour, but he engaged the Israelites to revolt from his father. Absalom was defeated in the wood of Ephraim: as he was flying, his hair caught hold of an oak, where he hung till Joab came and thrust him through with three darts: David had expressly ordered his life to be spared, and extremely lamented him.

ABSCESS, in surgery; from abscedo, to depart. A cavity containing pus; or, a gathering of matter in a part. So called, because the parts which were joined are now separated; one part recedes from another, to make way for the collected matter. See SURGERY.

ABSCISSA, in conics, a part of the diameter or transverse axis of a conic section intercepted between the vertex or some other fixed point and a semidiameter. See CONIC SECTIONS.

ABSCONSA, a dark lantern used by the monks at the ceremony of burying their dead.

ABSENCE, in Scots law: When a person cited before a court does not appear, and judgment is pronounced, that judgment is said to be in abscence. No person can be tried criminally in abscence.

ABSINTHIATED, any thing tinged or impregnated with absinthium or wormwood. Bartholin mentions a woman whose milk was become abstiniated, and rendered as bitter as gall, by the too liberal use of wormwood. 

Vinum absintinites, or pectorum absinthitium, "wormwood wine," is much spoke of among the ancients as a whole-
wholesome drink, and even an antidote against drunkenness, though some have charged it with being offensive to the head, and liable to cause fevers, cephalalgias, vomitings, uterine fluxes, &c. Ray also makes it a preventative of venery. According to the common opinion, it is made by infusing the leaves of the plant in wine; but, according to Fehr, it ought to be prepared by fermentation, in order to correct the crudities, and call forth a volatile salt; which last, however, does not exist in wormwood. Some prefer the distilled water, but whatever virtues wormwood possesses reside entirely in its essential oil.

ABSINTHIUM, in botany, the trivial name of the common wormwood. See the article ARTEMISIA.

ABSIS, in astronomy, the same with apsis. See APSIS.

ABSOlute, in a general sense, something that stands free or independent.

Absolute is more particularly understood of a being or thing which does not proceed from any cause, or does not subsist by virtue of any other being, considered as its cause; in which sense, God alone is absolute. Absolute, in this sense, is synonymous with independent, and stands opposed to dependent.

Absolute also denotes a thing's being free from conditions or limitations; in which sense, the word is synonymous with unconditional. We say, an absolute decree, absolute promise, absolute obedience.

Absolute Government, that wherein the prince is left solely to his own will, being not limited to the observance of any laws except those of his own direction.

Absolute Equation, in astronomy, is the aggregate of the optic and eccentric equations. The apparent inequality of a planet's motion arising from its not being equally distant from the earth at all times, is called its optic equation, and would subsist even if the planet's real motion were uniform. The eccentric inequality is caused by the planet's motion being uniform. To illustrate which, conceive the sun to move, or to appear to move, in the circumference of a circle, in whose centre the earth is placed. It is manifest, that if the sun moves uniformly in this circle, it must appear to move uniformly to a spectator on the earth, and in this case there will be no optic nor eccentric equation: but suppose the earth to be placed out of the centre of the circle, and then, though the sun's motion should be really uniform, it would not appear to be so, being seen from the earth; and in this case there would be an optic equation, without an eccentric one. Imagine farther, the sun's orbit to be not circular, but elliptic, and the earth in its focus; it will be as evident that the sun cannot appear to have a uniform motion in such ellipse: so that his motion will then be subject to two equations, the optic and the eccentric.

Absolute Number, in algebra, is any pure number standing in any equation without the conjunction of literal characters; as $2x + 5y = 28$; where 36 and 48 are absolute numbers, but 2 is not, as being joined with the letter $x$.

ABSOLUTION, in civil law, is a sentence whereby the party accused is declared innocent of the crime laid to his charge. Among the Romans, the ordinary method of pronouncing judgment was this: after the caufe had been pleaded on both sides, the praecox used the word dixerunt, q.q.d. they said what they had to say; then three ballots were distributed to each judge, marked as mentioned under the article A; and as the majority fell of either mark, the accused was absolved or condemned, &c. If he were absolved, the praecox dismissed him with videtur non esse, or juster est esse.

ABSOLUTION, in the canon law, is a judicial act, whereby the priest declares the sins of such as are present remitted. The Romanists hold absolution a part of the sacrament of penance: the council of Trent, feu. xiv. cap. iii. and that of Florence, in the decree ad Armenos, declare the form or essence of the sacrament to lie in the words of absolution, I absolve thee of thy sins. The formula of absolution, in the Romish church, is absolute: in the Greek church it is deprecatory; and in the churches of the reformed, declarative.

ABSOLUTION is chiefly used among protestants for a sentence whereby a person who stands excommunicated is released or freed from that punishment.

ABSORBENT, in general, any thing possessing the faculty of absorbing, or swallowing up another. ABSORBENT Medicines, tinctures, powders, as chalk, crab-eyes, &c. which are taken inwardly for drying up or absorbing any acid or redundant humours in the stomatch or intestines. They are likewise applied outwardly to ulcers or sores with the same intention.

ABSORPTION Vesels, a name given promiscuously to the lasteal vessels, lymphatics, and inhalent arteries. See Anatomy.

Naturalists speak of the like absorbents in plants, the fibrous or hairy roots of which are as a kind of vas absorbentia, which attract and imbibe the nutritious juices from the earth. See PLANTS.

ABSORBING, the swallowing up, sucking up, or imbibing any thing: thus black bodies are said to absorb the rays of light; luxuriant branches, to absorb or waste the nutritious juices which should feed the fruit of trees, &c.

ABSORPTION, in the animal economy, is the power whereby the absorbent vessels imbibe the juices, &c.

ABSORPTIONS of the Earth, a term used by Kircher and others for the finking in of large tracts of land by means of subterraneous commotions, and many other accidents.

Pliny tells us, that in his time the mountain Cymbotus, with the town of Eurus, which stood on its side, were wholly absorbed into the earth, so that not the least trace of either remained; and he records the like fate of the city Tantalus in Magnesia, and after it of the mountain Syelbus, both thus absorbed by a violent opening of the earth. Galanis and Garnatus, towns once famous in Phocis, are recorded to have met the same fate: and the well promontory, called Phlegethon, in Ethiopia, after a violent earthquake in the night-time, was not to be seen in the morning, the whole having disappeared, and the earth closed over it. These and many other histories, attested by the authors of greatest credit among the ancients, abundantly prove the fact in the earlier ages; and there have been not wanting too many instances of more modern date. Kircher's Mund. Subterr. p. 77. See EARTH and EARTHQUAKE.
Abstemious, properly understood of a person who refrains absolutely from all use of wine.

The history of Mr. Wood, in the Medici. Trans. vol. ii. p. 261. art. 18. is a very remarkable exemplification of the very beneficial alterations which may be effected on the human body by a strict course of abstinence.

The Roman ladies, in the first ages of the republic, were all enjoined to be abstemious; and that it might appear, by their breath, whether or no they kept up themselves the use of such meats as were prohibited by that selection of ancient authors.

Abstemiosus (Laurentius), a native of Macerata, professor of belles lettres in Urbino, and librarian of Duke Guido Ubaldo, under the pontificate of Alexander VI. He wrote, 1. Notes on most difficult passages of ancient authors. 2. Hecatomthyum, i. e. A collection of 100 fables, &c. which have been often printed with those of Aesop, Phaedrus, Gabrias, Avicinus, &c.

Abstergent medicines, those employed for resolving obstructions, concretions, &c. such as soap, &c.

Abstinence, in a general sense, the act or habit of refraining from something which we have a propensity to or find pleasurable. Among the Jews, various kinds of abstinence were ordained by their law.

Among the primitive Christians, some denied themselves the use of such meats as were prohibited by that law, others looked upon this abstinence with contempt; as to which, St. Paul gives his opinion, Rom. xiv. 1 - 3. The council of Jerusalem, which was held by the Apostles, enjoined the Christian converts to abstain from meats strained, from blood, from fornication, and from idolatry. Abstinence, as prescribed by the gospel, is intended to mortify and restrain the passions, to humble our vicious natures, and by that means raise our minds to a due sense of devotion. But there is another sort of abstinence, which may be called ritual, and consists in abstaining from particular meats at certain times and feasts. It was the spiritual monarchy of the western world which first introduced this ritual abstinence; the rules of which were called regulations; but grotesquely abused from the true nature and design of fasting. In England, abstinence from flesh has been enjoined by statute even since the reformation, particularly on Fridays and Saturdays, on vigilis, and on all commonly called fast-days. The like injunctions were renewed under Elizabeth: but at the same time it was declared, that this was done not out of motives of religion, as if there were any difference in meats; but in favour of the consumption of fish, and to multiply the number of fishermen and mariners, as well as spare the flock of the sheep. The great fault, says St. Augustine, is to abstain from sin.

Abstinence is more particularly useful for a spare diet, or a slender parthimonious use of food, below the ordinary standard of nature. The physicians relate wonders of the effects of abstinence in the cure of many disorders, and protracting the term of life. The noble Venetian, Cornaro, after all imaginable means had proved vain, so that his life was despaired of at 40, recovered, and lived to near 100, by mere dint of abstinence; as he himself gives the account. It is indeed surprising to what a great age the primitive Christians of the east, who retired from the persecutions into the deserts of Arabia and Egypt, lived, healthful and cheerful, on a very little food. Cassian affures us, that the common rate for 24 hours was 12 ounces of bread, and mere water; with this St. Anthony lived 105 years; James the Hermit 104; Arsenius, tutor of the Emperor Arcadius, 120; S. Ephraim, 115; Simeon the Stylite, 112; and Rumauld, 120. Buchanan writes, that in Scotland one Laurence preferred himself to 450 by force of temperance and labour; and Spottwood mentions one Kentigern, afterwards called S. Mongah or Mungo, who lived to 185 by the same means. Other instances see under the article Longevity.

Abstinence, however, is to be recommended only as it means a proper regimen; for in general it must have bad consequences when observed without a due regard to constitution, age, strength, &c. According to Dr. Cheyne, most of the chronic diseases, the infirmities of old age, and the short lives of Englishmen, are owing to repletion; and may be either cured, prevented, or remedied by abstinence: but then the kinds of abstinence which ought to obtain, either in sickness or health, are to be deduced from the laws of diet and regimen.

Among the brute creation, we see extraordinary instances of long abstinence. The serpent-kind, in particular, bear abstinence to a wonderful degree. We have seen rattle-shakes that had subsisted many months without any food, yet still retained their vigour and fierceness. Dr. Shaw speaks of a couple of serpents, (a sort of Egyptian serpents,) which had been kept five years in a bottle close corked, without any sort of food, unless a small quantity of sand wherein they coiled themselves up in the bottom of the bottle may be reckoned as such; yet when he fed them, they had newly cast their skins, and were as brisk and lively as if just taken. But it is even natural for divers species to pass four, five, or six months every year, without either eating or drinking. Accordingly, the tortoise, bear, dormouse, serpent, &c. are observed regularly to retire, at these seasons, to their respective cells, and hide themselves, some in the caverns of rocks or ruins; others dig holes under ground; others get into woods, and lay themselves up in the crevices of trees; others bury themselves under water, &c. And these animals are found as fat and fleshy after some months abstinence as before.

Sir G. Ent* weighed his tortoise several years successively, at its going to earth in October, and coming out again in March; and found, that of four pounds, twelve ounces, it only used to lose about one ounce.

*Phil. Trans.
Abstinence months as strictly abstinence as other creatures. In particular, the records of the Tower of London mention a Scotchman imprisoned for felony, and strictly watched in for three weeks: in all which time he took not the least sustenance: for which he had his pardon. Numberless instances of extraordinary abstinence, particularly from morbid causes, are to be found in the different periodical Memoirs, Transactions, Ephemerides, &c. It is to be added, that, in most instances of extraordinary human abstinence related by naturalists, there were said to have been apparent marks of a texture of blood and humours, much like that of the animals abovementioned. Though it is no improbable opinion, that the air itself may furnish something for nutrition. It is certain, there are substances of all kinds, animal, vegetable, &c. floating in the atmosphere, which must be continually taken in by respiration. And that an animal body may be nourished thereby, is evident in the instance of vipers; which if taken when first brought forth, and kept from every thing but air, will yet grow very considerably in a few days. So the eggs of lizards are observed to increase in bulk, after they are produced though there be nothing to furnish the increment but air alone; in like manner as the eggs or spawn of fishes grow and are nourished with the water. And hence, say fome, it is that cooks, turnpits, dogs, &c. though they eat but little, yet are usually fat. See Fasting.

ABSTINENTS, or ABSTINENTS, a set of heretics that appeared in France and Spain about the end of the third century. They are supposed to have borrowed part of their opinions from the Gnostics and Manicheans, because they opposed marriage, condemned the use of flesh meat, and placed the Holy Ghost in the place of created beings. We have, however, no certain account of their peculiar tenets. See ABSTRACTION.

ABSTRACT, in a general sense, any thing separated from something else. ABSTRACT Idea, in metaphysics, is a partial idea of a complex object, limited to one or more of the component parts or properties, laying aside or abstracting from the rest. Thus, in viewing an object with the eye, or recollecting it in the mind, we can easily abstract from some of its parts or properties, and attach ourselves to others: we can attend to the redness of a cherry, without regard to its figure, taste, or consistence. See ABSTRACTION.

ABSTRACT Terms, words that are used to express abstract ideas. Thus beauty, ugliness, whiteness, roundness, life, death, are abstract terms. ABSTRACT Numbers, are assemblages of units, considered in themselves without denoting any particular and determined particulars. Thus 6 is an abstract number, when not applied to anything; but, if we say 6 feet, 6 becomes a concrete number. See the article NUMBERS.

ABSTRACT Mathematics, otherwise called Pure Mathematics, is that which treats of magnitude or quantity, absolutely and generally considered, without restriction to any species of particular magnitude; such are Arithmetic and Geometry. In this sense, abstract mathematics is opposed to mixed mathematics; wherein simple and abstract properties, and the relations of quantities primitively considered in pure mathematics, are applied to sensible objects, and by that means become intermixed with physical considerations; such as Hydrostatics, Optics, Navigation, &c.

ABSTRACT, in literature, a compendious view of any large work; shorter and more superficial than an abridgment.

ABSTRACTION, in general, the act of abstracting, or the state of being abstracted.

ABSTRACTION, in metaphysics, the operation of the mind when occupied by abstract ideas. A large idea fixes our attention, and abstracts us from the troubles that surround it. In the same manner, a beautiful woman in a crowd, abstracts our thoughts, and engrosses our attention solely to herself. These are examples of real abstraction: when thee, or any others of a similar kind, are recalled to the mind after the objects themselves are removed from our sight, they form what are called abstract ideas, or the mind is said to be employed in abstract ideas. But the power of abstraction is not confined to objects that are separable in reality as well as mentally: the figure, the figure, the colour of a tree are inseparably connected, and cannot exist independent of each other; and yet we can mentally confine our observations to one of the properties, neglecting or abstracting from the rest.

Abstraction is chiefly employed these three ways. First, When the mind considers any one part of a thing, in some respect distinct from the whole; as a man's arm, without the consideration of the rest of the body. Secondly, When we consider the mode of any substance, omitting the substance itself; or when we separately consider several modes which subsist together in one object. This abstraction the geometers make use of when they consider the length of a body separately, which they call a line, omitting the consideration of its breadth and thickness. Thirdly, It is by abstraction that the mind forms general or universal ideas; omitting the modes and relations of the particular objects whence they are formed. Thus, when we should understand a thinking being in general, we gather from our self-consciousness what it is to think; and, omitting these things which have a particular relation to our own minds, or to the human mind, we conceive a thinking being in general.

Ideas formed in this manner, which are what we properly call abstract ideas, become general representatives of all objects of the same kind; and their names applicable to whatever exists conformable to such ideas. Thus the idea of colour that we receive from chalk, snow, milk, &c. is a representative of all that kind; and has a name given it, white, which signifies the same quality wherever found or imagined.

ABSTRUSE, something deep, hidden, concealed, or far removed from common apprehensions, and therefore not easily understood; in opposition to what is obvious and palpable. Thus metaphysics is an abstruse science; and the doctrine of fluxions, and the method de maxima et minima, are abstruse points of knowledge.

ABSURD, an epithet applied to anything that opposes the human apprehension and contradicts a manifest truth. Thus, it would be absurd to say that 6 and 6 make only 10, or to deny that twice 6 make 12. When the term absurd is applied to actions, it has the same import as ridiculous. ABSYN-
ABSYNTHIUM. See ABSINTHIUM.

ABSYNTHIUM, in the heathen mythology, the son of Eta and Hypsea, and the brother of Medea. The latter running away with Jason, after her having affinitiated him in carrying off the golden fleece, was perfured by her father; when, to stop his progress, the tears of Abysynius in pieces, and scattered his limbs in his way.

ABTHANES, a title of honour used by the ancient inhabitants of Scotland, who called their nobles thanes, which in the old Saxon signifies king's miniflers, and of thefe the higher rank were styled abithanes, and thole of the lower underthanes.

ABUCCO, Abuco, or Abocchi, a weight used in the kingdom of Pegu. One abucco contains 124, tectcalls; two abuccos make a giro or agire; two giri, half a hiza; and a hiza weighs an hundred tectcalls; that is, two pounds five ounces the heavy weight, or three pounds nine ounces the light weight of Venice.

ABUKESO, in commerce, the fame with ASLAN.

ABULFARAGIUS (Gregory), son to Aaron a physician, born in 1226, in the city of Malatia, near the source of the Euphrates in Armenia. He followed the profession of his father; and practifed with great success, numbers of people coming from the most remote parts to ask his advice. However, he would hardly have been known at this time, had his knowledge been confined to phyfic, but he applied himself to the study of the Hebrew, Syriac, and Arabic languages, as well as philosophy and divinity; and he wrote a hiftry which does honour to his memory. It is written in Arabic, and divided into diñtiftics. It consists of ten parts, being an epitome of universal hiftry from the creation of the world to his own time. Dr Pocock published it with a Latin translation in 1663; and added, by way of supplement, a short continuation relating to the hiftry of the eastern princes.

ABUNA, the title given to the archbishop or metropolis of Abyssinia. See Abyssinia.

ABUNDANT MEMBERS, in arithmetic, is a number, the sum of whose aliquot parts is greater than the number itself. Thus the aliquot parts of 12, being 1, 2, 3, 4, and 6, they make, when added together, 16. An abundant number is oppofed to a deficient number, or that which is greater than all its aliquot parts taken together; as 14, whose aliquot parts are 1, 2, and 7, which make no more than ten: and to a perfect number, or one to which its aliquot parts are equal, as 6, whose aliquot parts are 1, 2, and 3.

ABUNDANTIA, a heathen divinity, repreffented in ancient monuments under the figure of a woman with a pleasing aspect, crowned with garlands of flowers, pouring all sorts of fruit out of a horn which she holds in her right hand, and feating grain with her left, taken poffecively from a sheaf of corn. On a medal of Trajan, she is repreffented with two cornucopias.

ABUSAID, (Ebn Aljapin), Sultan of the Moguls, fucceeded his father anno 717 of the hegira. He was the last monarch of the race of Jenghis Khan, and after his death, which happened the fame year that Tamerlane was born, the empire was made a scene of blood and defolation.

ABUS, (anc. geog.), a river of Britain, formed by the confluence of the Ure, the Derwent, Trent, &c. falling into the German sea, between Yorkshire and Lincolnshire, and forming the mouth of the Humber.

ABY, Abufc.

ABUSE, an irregular use of a thing, or the introducing something contrary to the true intention thereof. In grammar, to apply a word abufively, or in an abuse fene, is to mistake its meaning.

A permutation of benefices, without the consent of the bishop, is termed abufe, and consequently null.

ABUTILON, in botany, the trivial name of several species of the fida. SeeSRa.

ABYDOs, (anc. geog.), anciefly a town built by the Milefians in Asia, on the Hellespont, where it is fcarce a mile over, oppofite to Sefos on the European fide. Now both called the Dardanellae. Abyssos lay midway between Lampacus and Ilium, famous for Xerxes's bridge, (Herodotus, Virgil); and for the loves of Leander and Hero. (Mufaeus, Ovid;) celebrated also for its ruins, (Ennius, Virgil.) The inhabitants were a foil, effeminate people, given much to deftraction; hence the proverb, Ne teneres Abyssos when we would caution againil danger, (Stephanus).

ABYDOS, (anc. geog.), anciefly an inland town of Egypt, between Ptolemais and Diospolis Parva, towards Syene, famous for the palace of Memnon and the temple of Otiiris. A colony of Milefians; (Stephanus.) It was the only one in the country into which the fingers and dancers were forbid to enter.

This city, reduced to a village under the empire of Augufus, now presents to our view only an heap of ruins without inhabitation; but to the fleft of these ruins is still found the celebrated tomb of Isanderes. The entrance is under a portico 60 feet high, and supported by two rows of maffy columns. The immoveable folidity of the edifice, the huge maffes which compose it, the hieroglyphics it is loaded with, flamp it a work of the ancient Egyptians. Beyond it is a temple 300 feet long and 145 wide. Upon entering the monument we meet with an immenfe hall, the roof of which is supported by 28 columns 60 feet high and 19 in circumference at the base. They are 12 feet distant from each other. The enormous fones that form the ceiling, perfectly joined and inerupted, as it were, one in the other, offer to the eye nothing but one folid platform of marble 116 feet long and 26 wide. The walls are covered with hieroglyphics. One fees there a multitude of animals, birds, and human figures with pointed caps on their heads, and a piece of stuff hanging down behind, dressed in loose robes that came down only to the waif. The sculpture, however, is clumsy; the forms of the body, the attitudes and proportions of the members, ill observed. Amongst these we may dilinguish fome women suckling their children, and men presenting offerings to them. Here also we meet with the divinities of India. Monfieur Chevalier, formerly governor of Chandernagore, who refided 20 years in that country, carefully vifited this monument on his return from Bengal. He remarked here the gods Fagus, Grenet, Gomez, and Vechan or Wifnon, fuch as they are repreffented in the temples of Indoftan.—A great gate opens at the bottom of the fift hall, which leads to a apartment 46 feet long by 24 wide. Six square pillars support the roof of it; and at the angles are the doors of four other chambers, but f0choaked up with rubbith that they cannot now be entered. The falt hall, 64 feet long by 24 wide, has fairs by which one descends into the fubterraneous apartments of this grand edifice. The Arabs, in searching after treasure, have piled
ABY

ABY

Abydos

Aby.

piled up heaps of earth and rubbish. In the part we
are able to penetrate, sculpture and hieroglyphics are
discouraged as in the upper story. The natives say that
they correspond exactly with those above ground, and
that the columns are as deep in the earth as they are
lofty above ground. It would be dangerous to go far
into those vaults; for the air of them is so laden with a
nephtic vapour, that a candle can scarce be kept burn­
ing in them. Six lions heads, placed on the two sides
of the temple, serve as spouts to carry off the water.
You mount to the top by a

and

The walls, the roof, and the columns of this edifice,
have suffered nothing from the injuries of time; and
did not the hieroglyphics, by being corroded in some
places, mark its antiquity, it would appear to have been
newly built. The solility is such, that unless people
make a point of destroying it, the building must last
a great number of ages. Except the colossal figures,
whose heads serve as an ornament to the capitals of the
columns, and which are sculptured in relief, the rest
of the hieroglyphics which cover the inside are carved
in stone. To the left of this great building we meet
with another much smaller, at the bottom of which is
a fort of altar. This was probably the sanctuary
of the temple of Osiris.

ABYLA, (Ptolemy, Mela): one of Hercules’ pil­
lars on the African side, called by the Spaniards Sierr­
da de las Monas, over against Calpe in Spain, the other pillar
supposed to have been formerly joined, but dif­
parated by Hercules, and thus to have given entrance
to the sea now called the Mediterraneum: the limits
of the labours of Hercules, (Pline.)

ABYSS, in a general sense, denotes something pro­
found, and, as it were, bottomless. The word is or­
ierally Greek, Αύσσης, compounded of the primitive αυ,
and παρει, q.e.d. without a bottom.

Abyss, in a more particular sense, denotes a deep
mias or fund of waters. In this sense, the word is
particularly used, in the Septuagint, for the water
which God created at the beginning with the earth,
which replenished it round, and which our tran­
fators render by deep. Thus it is that darkness is said
to be upon the face of the abyss.

Abyss is also used for an immense cavern in the
earth, wherein God is supposed to have collected all
those waters on the third day; which, in our version,
is rendered the seas, and elsewhere the great deep. Dr
Woodward, in his Natural History of the Earth, af­
fers, That there is a mighty collection of waters in­
cluded in the bowels of the earth, constituting a huge
orb in the interior or central parts of it; and over the
surface of this water he supposes the terrestial strata to
be expanded. This, according to him, is what Moses
calls the great deep, and what most authors render the
great abyss. The water of this vast abyss, he alleg­
es, does communicate with that of the ocean, by means of
certain interstices or chasms passing betwixt it and
the bottom of the ocean; and this and the abyss he sup­
poses to have one common centre, around which the
water of both is placed; but that, the ordinary sur­
face of the abyss is not level with that of the ocean,
or at a great distance from the centre as the other,
ABY

Abyssinia, or by some called Higher Ethiopia, and by the Arabian Al Habab, is bounded on the north by Nubia; on the east, by the Arabic gulf or Red Sea, and the kingdom of Adel; on the south, by the kingdoms of Ajan, Alabo, and Gingiro; and on the west, by the kingdoms of Goram, and part of Gingiro; and is divided into a great number of provinces. The principal river is the Nile, which has its source in this region when father Lobo visited this country in 1624.

The soil of the country is various. In some places there are nothing but rocks and profound caverns: in others, especially where there are rivers, the lands exceeding luxuriously; and the banks of these streams are bordered with flowers of various kinds, many of which are unknown in Europe. The torrents in the rainy season wash a great deal of gold from the mountains. This country produces a great variety of animals, both tame and wild, such as lions, tigers, rhinoceroses, leopards, elephants, monkeys, flags, deer, horfes, camels, dromedaries, goats, cows, sheep; likewise ostriches, with a vast variety of other birds. In the rivers are crocodiles and the hippopotamus. Travellers mention also a peculiar kind of bees, small, black, and without a stinger, which live in the earth, and make honey and wax that are extremely white. The country is greatly infested with locusts, which devour every thing that is green wherever they come.

The inhabitants are Moors, Pagans, Jews, and Christians. The last was the reigning and established religion when father Lobo visited this country in 1624. This diversity of people and religion is the reason that the kingdom, in different parts, is under different forms of government, and that their laws and customs are extremely various. Some of the people neither sow their crops nor improve them; but live on milk and flesh, and encamp like the Arabs, without any settled habitation. In some places they practice rites of worship, though they believe that there dwells in the regions above a Being who governs the world: This deity they call Oul. In these parts where Christianity is professed, it is so corrupted with superstitions and errors, that they have nothing that is good, unless it be the name of Christ, which little by little is lost among them.

They have two harvests in the year; one in winter, which begins in May, and lasts, with great rigor, through the months of July, August, and September; and the other in spring.

Every man who has a thousand cows saves once a year a day's milk, and makes a bath for his friends; so that to give an idea of a man's wealth, their common expression is, he bathes so many times a-year. Their males marry about ten years old, and their females younger. Their marriage tie is to boole, that they part whenever they find that they cannot live agreeably together.

Besides the large towns, there are a great number of villages, which in some places are so thick, that they look like one continued town: the houses are very mean, being but one story high, and built of straw, earth, and lime. In most of the towns the houses are separated by hedges, which are always green, and mixed with flowers and fruit-trees at a certain distance from each other, which affords an agreeable prospect. The government is monarchical. The sovereign has the title of Negus, and is an absolute prince. When he is in camp, the tents are so regularly disposed as to have the appearance of a city; and there is a captain over every division, to prevent disorders, and to execute justice.

The Abyssinians in general are of an olive complexion, tall, graceful, and well featured. Those who are neither mechanics nor tradesmen (which few of them are) nor tillers of the ground, are inured to bear arms, which are a head-piece, a buckler, a coat of mail, bows and arrows, darts, pikes capped with iron at both ends, a fling, and a sword: they have very few fire-arms, and those were introduced by the Portuguese. The habit of perfons of quality is a fine silken vest, or fine cotton, with a kind of scarf. The citizens have the same habit, only coarser. The common people have nothing but a pair of cotton drawers, and a scarf, which covers the rest of their body. The women are of a healthy constitution, active, and moderately handsome, having neither flat noses nor thick lips like the negroes; and nature is so friendly, that they stand in little need of midwives, which is indeed the case, of most countries in the torrid zone. They appear in public as in Europe, without being forbidden the conversation of the men as among the Mahometans. Princesses of the royal blood are not permitted to marry foreigners: and when they take the air, they go in great state, with 400 or 500 women attendants. Their language is the Ethiopic, which bears a great affinity with the Arabic; but particular provinces have a different dialect.

Manufactures are almost wholly wanting in this country; and the few trades which they have amongst them are always conveyed from the father to the children. They seem indeed by their churches, and other ruined places, to have had a knowledge of architecture. But the workmen were sent for from other countries, and were forced to do all themselves; so that when these fabrics were reared, especially the imperial palace built by Peter Pais, a Portuguese architect, the people flocked from all parts of Ethiopia to view it, and admired it as a new wonder of the world. Gold, silver, copper, and iron, are the principal ores with which their mines abound in this extensive part of Africa; but not above one third part is made use of by way of merchandize, or converted into money, of which they have little or no use in Abyssinia. They cut their gold indeed into small pieces for the pay of their troops, and for expences of the court, which is but a modern custom among them;
Abyllinia, them; the king's gold, before the end of the 17th century, being laid up in his treasury in ingots, with intent to be never carried out, or never used in any thing but vellels and trinkets for the service of the palace.

In the lieu of small money, they make use of rock salt as white as snow and as hard as flone. This is taken out of the mountain of Lafa, and put into the king's warehouses; where it is reduced into tablets of a foot long, and three inches broad, ten of which are worth about a French crown. When they are circulated in trade, they are reduced into still smaller pieces, as occasion requires. This salt is also applied to the same purpofe as common sea-salt. With this mineral salt they purchase pepper, spices, and silk fuffs, which are brought to them by the Indians, in their ports in the Red Sea. Cardamums, ginger, aloes, myrrh, cassia, civet, ebony-wood, ivory, wax, honey, cotton and linnen of various forts and colours, are merchandizes which may be had from Abyllinia; to which may be added sugar, hemp, flax, and excellent wines, if these people had the art of preparing them. It is affirmed there are in this country the finest emeralds that are any where to be found; and, though they are found but in one place, they are there in great quantities, and some so large and so perfect as to be of almost inefitable value. The greatest part of the merchandise abovementioned, are more for foreign than inland trade. Their domestic commerce consists chiefly in salt, honey, buck-wheat, grey peafe, citrons, oranges, lemons, and other provisions, with fruits and herbage necessary for the fupport of life. Thofe places that the Abyssinian merchants frequent the moft, who dare venture to carry their commodities by sea themfelves, are Arabia Felix, and the Indies, particularly Goa, Cambay, Bengal, and Sumatra. With regard to their ports on the Red Sea, to which foreign merchants commonly refort, the moft confiderable are thofe of Mette, Azun, Zajalla, Maja, Dazo, Patea, and Brava. The trade of the Abyssinians by land is inconsiderable. There are, however, bands of them who arrive yearly at Egypt, particularly at Cairo, laden with gold dust, which they bring into trade for merchandise of that country, or of Europe, for which they have occasion. Thofe caffias or caravans, if we may be allowed thus to call a body of 40 or 50 poor wretches who unite together for their mutual affitance in their journey, are commonly three or four months on their route, traversing forests and mountains almost impaffable, in order to exchange their gold for necessaries for their families, and return immediately with the greatest part of the merchandise on their backs. Frequently the Jews or Egyptians give them large credit; which may feem surprising, as they are beyond recourfe if they shou'd fail of payment. But experience has shown, that they have never abus'd the confidence repofed in them; and even in the event of death, their fellow-travellers take care of the effects of the deceafed for the benefit of their families, but in the first place for the discharge of thofe debts contracted at Cairo.—It remains only to be obferved, that one of the principal branches of trade of the Abyssines is that of slaves, who are greatly efteemed in the Indies and Arabia for the beft and moft faithful, of all that the other kingdoms of Africa furnifh. The Indian and Arabian merchants frequently substitute them as their fafeguards; and on account of their good services and integrity, not only often give them their liberty, but liberally reward them.

Into this part of the globe the admiffion of travellers has been fuppos'd extremely difficult, and their return from thence almost impracticable. A Scotch gentleman, however, of family and fortune, James Bruce, Efq; of Kinnaird, is known not only to have entered that country, but to have refided in it feveral years, and returned safe home, bringing with him many great curiosities. Soon after his return, the following notice was given by the Count de Buffon in an advertisement prefixed to the 3d volume of his History of Birds: "A new aid which I have received, and which I am anxious to announce to the public, is the free and generous communication which I had of the drawings and observations of James Bruce, Efq; of Kinnaird, who returning from Abyssinia, and the interior parts of Abyllinia, has made a particular of the knowledge which he had acquired in a tour no less fatiguing than hazardous. It filled me with the utmost aflonishment to view the numerous drawings which he had made and coloured himself. He poliftles the moft perfect representations and descriptions of the birds, flowers, plants, edifices, monuments, arms, &c. of different nations, all of them objects worthy of knowledge. Nothing has escaped his curiosity, and his talents have been proportioned to it. The English government will without doubt take proper measures for the publication of his work. That respectable nation, which has given a lead to all others in discoveries of every kind, will not fail to add to its glory, by speedily communicating to the world at large, those of this excellent traveller, who, not contented with accurate descriptions of nature, has made many important observations on the culture of different kinds of grains; on the navigation of the Red Sea; on the course of the Nile, from its mouth to its source, which he has been the first to discover; and on different particulars which may be of the highest utility to commerce and agriculture, those great arts which are but little known and ill cultivated. Yet, on the whole, the superiority of one nation over another does depend, and for ever will depend." It is much to be regretted, that after fo long an interval, this gentleman's discoveries have not yet made their appearance. The delay has given rise to various speculations. Doubts have even been entertained concerning the credibility of the reports that have tranffpired, or been gathered from his conversation. His honour and abilities, however, are too extensively known to be affected by fuch injurious infinuations. That he has great talents for communicating the information of the regions he has visited, appears by his difcription on the Theban Harp,* See the article Harp in this Dictionary.

Mr Bruce moreover, is said to have given a great facility in leaming languages, and talents for drawing; nor perhaps was any other traveller furnished with fo large and scientific an apparatus of instruments. Add to all this, that he is poliffed of a spirit and enterprife not easily to be equalled. The speedy production, therefore, of fo interesting an account as he is capable of giving, of this almost unfrequented part of Africa, cannot but fill be
Abythnia. carefully wished for. In the mean time, the following authentic anecdotes will not, it is presumed, be unacceptable, nor appear foreign to the present article.

Mr Bruce was appointed consul to Algiers, where he continued till 1764. In June 1764, he requested leave of absence from the secretary of state for the southern department, in order to make some drawings of antiquities near Tunis.

In Mr Bruce's last letter from Algiers to the same secretary (dated December 29th 1764), he alludes to another leave of absence, which he had likewise requested, that he might visit parts of the African continent. He explains himself no farther in this letter; but it is believed that he proceeded considerably to the southward of Algiers, and made those very capital drawings of remains of Roman architecture, which many have seen since his return to Britain. Before he set out for Algiers, he informed some of his friends, that the making such excursions for these interesting purposes was his principal inducement for accepting the consulship.

How long he continued in Africa, the present writer has not had the opportunity of procuring information; but having intentions afterwards of visiting Palmyra, he was shipwrecked on the coast of Tunis, and plundered of every thing by the barbarous inhabitants.

The most delightful part of the loss was probably that of his instruments, so necessary to a scientific traveller; and though he afterwards procured some of these, yet others (particularly a quadrant) could not be recovered. Mr Bruce, however, determining to repair this loss as soon as possible from France, so much nearer to him than England, was so fortunate as to be provided with a time-piece and quadrant from that quarter. Upon this occasion Lewis XV. presented him with an iron quadrant of four feet radius, as he had probably represented to the academy of sciences his want of such an instrument whilst he should be in Abythnia: Mr Bruce brought back with him to England this cumbersome fellow-traveller, and, having put upon it an inscription to the following purport, is said to have presented it to the university of Glasgow:

"With this instrument given by the king of France, Lewis XV. Mr Bruce proceeded to the sources of the Nile, it being carried on foot, upon mens shoulders, over the mountains of Abythnia." This information was received from that eminent maker of instruments Mr Nairne.

Where and when Mr Bruce received the French instruments is not known; but as he was still bent on visiting Abythnia, he gave a commission to Mr W. Ruffel, F. R. S. for a reflecting telescope, made by Bird or Short; a watch with a hand to point seconds, and the newest and completest English astronomical tables; all of which were to be sent to Mr Fremaux, and forwarded to him at Alexandria before August.

On the 29th of March 1768, Mr Bruce was at Sidon on the coast of Syria, and wrote to Mr Ruffel from thence for the following additional instruments, viz. a twelve-feet reflecting telescope, to be divided into pieces of three feet, and joined with screws. This telescope was also accompanied by two thermometers and two portable barometers. Mr Bruce moreover informed Mr Ruffel, that he was going into a country (viz. Abythnia) from which few travellers had returned; and wished Mr Ruffel, or his philosophical friends, would send him their desiderata, as he was entirely at their service. Mr Bruce added, that if he could not obtain admission into Abythnia, he still would do his best in the cause of science on the eastern coast of the Red Sea.

As Mr Bruce had directed the instruments to be ready for him at Alexandria by the beginning of August 1768, it is probable that he reached Cairo about that time; from whence he proceeded to Abythnia, by way of Jeddah, Mazava, and Arbitico.

It is supposed that Mr Bruce did not continue long at Jeddah, as he is said to have explored the coast on the east side as low as Mocha, during which drawings were taken of many curious ship in the Red Sea. Mr Bruce must also have entered Abythnia, either at the latter end of 1768, or the very beginning of 1769, as he made an observation in that part of Africa on the 15th of January of that year.

In this perilous enterprise he was accompanied by a Greek servant (named Michael), and an Italian painter, who probably assisted in the numerous articles which might deserve representation, and who died of a flux before Mr Bruce's return to Cairo in 1773. Mr Bruce must at times also have been assisted by many others, as his instruments, apparatus for drawings, and other necessaries, from their weight and bulk could not be easily transported from place to place, and perhaps required beasts of burden. To these likewise must be added several medicines which enabled him to perform cures on the inhabitants, and probably occasioned the good reception he afterwards met with.

Such other particulars as happened to Mr Bruce, during his long residence in this unfrequented country, must be left to his own superior narrative; and it shall suffice, therefore, only to state, that he made a large number of observations to fix the situations of places, out of which 31 have been examined and computed by the astronomer royal. The first of these observations was made on the 10th of January 1769, and the last on the 5th of October 1772, from 20 to 28 degrees of east longitude from Greenwich, and from 12 to 28 degrees of north latitude. It need scarcely be said therefore, that these observations, which include so large an extent of almost unknown country, must prove a most valuable addition to geography; and the more so, because the Portuguese, who first visited Abythnia, give neither longitude nor latitude of any place in that empire; and Poncet only two latitudes, viz. those of Sennar and Giefun.

As Mr Bruce made the last of his observations on the 5th of October 1772, it is probable that he might then be on his return to Cairo, through Nubia and Upper Egypt, where he arrived on the 15th of January 1773, after an absence of more than four years; bringing back with him his Greek servant, named Michael.

Mr Bruce continued at Cairo four months, during which time, he had daily intercourse with Mr Antes; the substance of a letter from whom will contain the principal confutation of Baron Tott, and others, who have been increasest in regard to Mr Bruce's expected narrative.

Mr Antes was born of German parents, who were possessed of lands in the back settlements of Pennsylvania.
Abyffinia: and having showed early abilities as a mechanic, removed to Europe, where he distinguished himself in the art of watch-making, which he learned without apprenticeship. Being a member of the church known by the name of Unitas Fratrum, and commonly called Mennonites, he wished to be employed in their missions, and more especially of the same persuasion established at Cairo, who always have desired to procure opportunities of instructing the Abyffiniants.

Mr Bruce had left Cairo fifteen months before Mr Antes came there; and the intercourse, therefore, between them first took place on Mr Bruce's return in 1773.

Having given this account of Mr Bruce and Mr Antes's being first known to each other, we shall state the substance of some information received from the latter, who is now established at Fulneck near Leeds, after having resided eleven years at Cairo.

"That Mr Bruce left Cairo in 1768, and proceeded thence by way of Jeddah, Mecca, and Arquico, into Abyssinia."

"That in 1771, a Greek came from Gondar (the capital) in Abyssinia, who had a draught from Mr Bruce on a French Merchant at Cairo (named Roë) for some hundreds of German coins, which were paid immediately. This draught was accompanied by a letter from Mr Bruce, and was the first time that he had been heard of at Cairo since his departure in 1768."

"That after Mr Bruce's return to Cairo in 1773, Mr Antes saw a young Armenian and his father (who came likewise from Gondar) at Mr Pini's, an Italian merchant of Cairo, where they and Mr Bruce conversed in the Abyssinian language, and seemed glad to meet him again."

"That Mr Bruce returned to Cairo from Abyssinia by way of Nubia and Upper Egypt; which can be fully attested by the Franciscan friars who are established at Asyut near Asyuan, which latter is the highest town of Upper Egypt."

"That during Mr Bruce's stay at Cairo, which was not less than four months, no day passed without their seeing each other; which gave Mr Antes frequent opportunities of inquiring with regard to Abyssinia, concerning which he was particularly interested from a reason before stated."

"That Mr Antes likewise frequently conversed with Michael, Mr Bruce's Greek servant; who is flated to have by no means had a lively imagination, and who always agreed with the circumstances mentioned by his master, and more particularly in relation to their having visited the sources of the Nile; which the Baron Tott doubts of, from having had a conversation with this same Greek servant."

Mr Antes adds, "That Baron Tott stated but a few days at Cairo; and, from his short residence in that country, hath given several erroneous accounts relative to Egypt. Mr Antes, on the other hand, had almost daily conversations with Michael for several years, and often in relation to the sources of the Nile."

"Lastly, "That after Mr Bruce left Cairo, Mr Antes had conversed with others who had known Mr Bruce in Abyssinia, and that he was there called Martha Jakobs, or Mr James."

After this state of facts, it is conceived that no one can entertain a reasonable doubt with regard to Mr Bruce's not only having visited, but resided long in Abyssinia; though it is remarkable that the Jesuits expressed the same doubts in relation to Poncet, who had continued there nearly as long as Mr Bruce. Poncet happened to be a layman; and the Jesuits, perhaps, would not approve of any narrative that did not come from father Beneventi, who accompanied Poncet to Abyssinia, but unfortunately died there (a)."

Driven, however, from this hold, the objectors will possibly retain their incredulity as to many particulars to be related.

The first of these is, the having visited the sources of the Nile; which, from classical education, we cannot easily believe, as they were unknown to the ancients, though they had so great a curiosity with regard to this discovery."

Many things, however, have been accomplished by travellers in modern times, which the ancients never could achieve, and which may be attributed to their want of enterprise (as travellers at least), of languages, and lastly the not being able to procure credit when in a distant country. Mr Bruce could not have continued so long as he did in Abyssinia, unless he had drawn from Gondar upon a merchant established at Cairo.

The difficulty, however, with regard to reaching the sources of the Nile, arises principally from the uncivilized state of Abyssinia, unless the traveller hath a proper introduction (b). When once this is procured, all difficulties seem to cease, as we find by Lobo's (c) account of this same discovery, and likewise by Poncet's account of this same discovery (d)."

(a) It must be admitted, however, that we owe to the zeal of the Jesuits the best accounts we have both of China and Paraguay. Few laymen have been actuated so strongly for the promotion of geography and science as Mr Bruce; and we must therefore (upon the order of the Jesuits being abolished) look up chiefly to the missionaries from the church of the Unitas Fratrum, who, though differing so totally in other respects, seem to have an equal ardour with the Jesuits for instructing the inhabitants of countries unfrequented by Europeans. Such missions are already established in West Greenland, the coast of Labrador, N. Lat. 56. the back settlements of Carolina and Pennsylvania, in India, Bengal, and the Nicobar islands. Thoë established on the coast of Labrador send over yearly meteorological journals, which are communicated to the Royal Society. As for the dispute between Poncet and Maillet the French consul at Cairo, see Mod. Univ. Phil. vol. 6.

(b) The professing the knowledge of medicine was Poncet's introduction, and seems to have been that of Mr Bruce. Even in our own civilized country, how are quacks and mountebanks reportd to? And what an impression must Mr Bruce, with his magnificent and scientific apparatus, have made upon the inhabitants of such a country as Abyssinia?

(c) In father Telles's compilation. See also Ludolf, who describes the sources from Gregory, who was a native of Abyssinia. Father Paz was the first who visited them, A.D. 1622. His account of this is laid to be in the archives.
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Abyssinia, etc.'s narrative, who was prevented by illness from visiting the very spot, but hath given an ample relation from an Abyssinian who had often been there. Poncet, moreover, had obtained leave from the emperor to make this journey, which he states as not being a distant one, and that the emperor hath a palace near the very sources.

If it be doubted whether Mr Bruce hath visited the very source of the Nile, it may be answered, that perhaps no Englishman hath taken this trouble with regard to the sources of the Thames, which, like most other great rivers, is probably derived from many springs and rills in different directions.

The other objection which we have often heard, is, "That Mr Bruce hath mentioned in conversation, that the Abyssinians cut a slice from the living ox, esteemed it one of their greatest delicacies."

This sort of dainty, indeed, is not so considered in other parts of the globe; but every nation almost hath its peculiarities in the choice of their food. Do not we eat raw oysters within a second? Fish seem to equal practice seems to equal that of the Abyssinians! Do not cooks skin oysters whilst alive? And do not epicures crisp fish for the gratification of their appetites?

That the Abyssinians can eat beef in a raw state, is agreed both by Lobo and Poncet; and the former says, "Seeking it in the beast. Mr Atties, moreover, was told by a Franciscan monk, who went with the caravan from Abyssinia to Cairo (d), that he was witness of an ox being killed, and immediately devoured by the band of travellers.

One reason, perhaps, for this usage may be, the great heat of the climate, which will not permit meat to be kept a sufficient time to make it tender (as with us): and it is generally allowed, that a foul, dressed immediately after it is killed, is in better order for eating than if it is kept four and twenty hours.

Is it therefore extraordinary, that an Abyssinian epicure may really find (or perhaps fancy) that a piece cut from the beast whilst alive, may be more tender, or have a better relish, than if it is previously killed by the butcher? To this may be added, that according to the information which has been received on this head, Mr Bruce's account of this practice is much misrepresented by the objectors, who suppose that the ox lives a considerable time after these pieces are cut from it. When these dainty bits, however, have been sent to the great man's table (and which are probably taken from the fleshly parts), the beast soon afterwards expires, when the first artery is cut, in providing slices for the numerous attendants.

Upon the whole, the not giving credit to a traveller, because he mentions an usage which is very different from ours (and is undoubtedly very barbarous), seems rather to argue ignorance than acuteness.

This brings to recollection the incredulity which was shown to another distinguished traveller, Dr Shaw; who having mentioned, in an Oxford common room, that some of the Algerines were fond of lion's flesh, never could obtain any credit afterwards from his brother-fellows of the same college, though many of them were learned men. It is well known, however, that Dr Shaw states this same circumstance in the publication of his travels, that he is cited with the greatest approbation in almost every part of Europe.

Sir William Temple somewhere mentions, that a Dutch governor of Batavia, who lived much with one of the most considerable inhabitants of Java, could never obtain any credit from him after having mentioned, that in Holland water became a solid body. The traveller, who first saw a flying fish, probably told every one of this extraordinary circumstance as soon as he fet his foot on shore, and was probably discredited with regard to the other particulars of his voyage.

The natural cause and progress of the incredulity, which a traveller generally experiences, seems to be the following:

When he returns from a distant and little frequented country, every one is impatient to hear his narrative; from which, of course, he selects the more striking parts, and particularly the usages which differ most from our own. Some of the audience, disbelieving what the traveller hath mentioned, put questions to him which show their distrust. The traveller by this treatment becomes irritated, and answers some of them peevishly, others ironically, of which the interrogators afterwards take advantage to his prejudice. Nothing is more irritating to an ingenuous person than to find his affections are disbelieved. This is commonly experienced in the crofs examinations of almost every witness. To the diftrusts of the traveller on his return, we may add, the being often teasted by very ignorant questions.

ABYSSINIAN, in ecclesiastical history, is used as the name of a sect, or heresy, in the Christian church, established in the empire of Abyssinia. The Abyssinians are a branch of the Copts or Jacobites; with whom they agree in admitting but one nature in Jesus Christ, and rejecting the council of Chalcedon: whence they are also called Eutychians, and stand opposed to the Melchites. They are only distinguished from the Copts, and other sects of Jacobites, by some peculiar national usages. — The Abyssinian sect or church is governed by a bishop or metropolitan styled Abuna, sent them by the Coptic patriarch of Alexandria residing at Cairo, who is the only person that ordains priests. The next dignity is that of Komo, or Hegumenas, who is a kind of arch-prebend. They have canons also, and monks: the former of whom marry; the latter, at their admission, vow celibacy, but with a reservation: theft, is said, make a person scoundrel, before their superior, to keep charity; but add, in a low voice, as you keep it. The emperor has a kind of supremacy in ecclesiastical matters. He alone

archives of the college de propaganda fide at Rome. It is believed that there are many other curious particulars for the illustration of geography to be found in the same depository. Dr Shaw mentions, moreover, some papers of Lippi (who accompanied the French embassy into Abyssinia, A. D. 1704), which are to be found in the botanical library at Oxford.

(d) This points out another channel by which a traveller of enterprise may visit Abyssinia.
Acacia, or Robinia, or Honey-locust. See Gleditsia.

Acacia, in the Materia Medica, the inspissated juice of the unripe fruit of the Mimosa Nigrica.

This juice is brought from Egypt, in roundish masses, wrapped up in thin bladders. It is outwardly of a deep brown colour, inclining to black; inwardly of a reddish or yellowish brown; of a firm consistence, but not very dry. It soon softens in the mouth, and dissolves a rough, not disagreable taste, which is followed by a sweetish relish. This inspissated juice entirely dissolves in watery liquors, but is scarcely sensible acted on by rectified spirit.

Acacia is a mild astringent medicine. The Egyptians give it in spitting of blood, in the quantity of a dram, dissolv'd in any convenient liquor; and repeat this dose occasionally: they likewise employ it in collyria for strengthening the eyes, and in gargarsins for quinsey. Among us, it is little otherwise used than as an ingredient in mitridate and theriac, and is rarely met with in the shops. What is usually sold for the Egyptian acacia, is the inspissated juice of unripe fruits: this is harder, heavier, of a darker colour, and somewhat sharper taste, than the true sort. See the next article.

German Acacia, the juice of unripe fruits inspissated nearly.
nearly to dryness over a gentle fire, care being taken to prevent its burning. It is moderately aromatic, similar to the Egyptian acacia, for which it has been commonly cultivated in the houses. It is given in fluxes, and other disorders where hepatic medicines are indicated, from a scupple to a dram.

Acacia, among antiquaries, something resembling a roll or bag, seen on medals, as in the hands of several consuls and emperors. Some take it to represent a handkerchief rolled up, with which they made signals at the games; others, a roll of petitions or memorials; and some, a purple bag full of earth, to remind them of their mortality.

ACACIANS, in ecclesiastical history, the name of several sects of heretics; some of which maintained, that the Son was only a simile, not the same, substance with the Father; and others, that he was not only a distinct, but a dissimilar, substance. Two of these sects had their denomination from Acacius bishop of Caesarea, who lived in the fourth century, and changed his opinions, so as, at different times, to be head of both. Another was named from Acacius patriarch of Constantinople, who lived in the close of the fifth century.

ACACIUS, surnamed Lusus, because he was blind of one eye, was bishop of Caesarea in Palestine, and succeeded the famous Eusebius; he had a great share in the banishment of Pope Liberius, and bringing Felix to the see of Rome. He gave name to a sect, and died about the year 365. He wrote the life of Eusebius, and several other works.

Acacius (St.), bishop of Amida, in Mesopotamia, in 420, was distinguished by his piety and charity. He sold the plate belonging to his church, to redeem a slave who was delivered over irretrievably to the devil by Pope Felix III.

ACAD, or Acadh, (anc. geog.) the town in which Nimrod reigned, called Archad by the feventy; situated in Babylonia, to the eastward of the Tigris.

ACADEMIAN, or ACADEMIST, a member of an academy. See ACADEMY in a modern sense.

ACADEMICS, or ACADEMISTS, a denomination given to the cultivators of a species of philosophy originally derived from Socrates, and afterwards illustrated and enforced by Plato, who taught in a grove near Athens, consecrated to the memory of Academus, an Athenian hero; from which circumstance this philosophy received the name of academical. Before the days of Plato, philosophy had in a great measure fallen into contempt. The contradictory systems and hypotheses which had successively been urged upon the world were become so numerous, that, from a view of this incongruity and uncertainty of human opinions, many were led to conclude, that truth lay beyond the reach of our comprehension. Absolute and universal scepticism was the natural consequence of this conclusion. In order to remedy this abuse of philosophy and the human faculties, Plato laid hold of the principles of the academical philosophy; and, in his Phaedo, reasons in the following manner. "If we are unable to discover truth, (says he), it must be owing to two circumstances: either there is no truth in the nature of things; or the mind, from a defect in its powers, is not able to apprehend it. Upon the latter supposition, all the uncertainty and fluctuation in the opinions and judgments of mankind admit of an easy solution: Let us therefore be moderate, and ascribe our errors to the real weakness of our own minds, and not to the nature of things themselves. Truth is often difficult of access; in order to come at it, we must proceed with caution and diffidence, carefully examining every step; and after all our labour, we will frequently find our great efforts disappointed, and be obliged to confess our ignorance and weakness."

Labour and caution in their researches, in opposition to rash and hasty decisions, were the distinguishing characteristics of the disciples of the ancient academy. A philosopher, polished by these principles, will be slow in his progress; but will seldom fall into errors, or have occasion to alter his opinion after it is once formed. Vanity and precipitance are the great sources of scepticism. Hurried on by these instead of attending to the cool and deliberate principles recommended by the academy, several modern philosophers have plunged themselves into an absurd and ridiculous kind of scepticism. They pretend to discredit subjects that are plain, simple, and easily comprehended; but give peremptory and decisive judgments upon things that evidently exceed the limits of our capacity. Of these, Berkeley and Hume are the most considerable. Berkley denied the existence of every thing, excepting his own ideas. Mr Hume has gone a step further, and questioned even the existence of ideas; but at the same time has not hesitated to give determined opinions with regard to eternity, providence, and a future state, miraculous interpositions of the Deity, &c. subjects far above the reach of our faculties. In his essay on the academical or sceptical philosophy he has confounded two very opposite species of philosophy. After the days of Plato, indeed, the principles of the first academy were grossly corrupted by Arcesilaus, Carneades, &c. This might lead Mr Hume into the notion that the academical and sceptical philosophy were synonymous terms. But no principles can be of a more opposite nature than those which were inculcated by the old academy of Socrates and Plato, and the sceptical notions which were propagated by Arcesilaus, Carneades, and the other disciples of the succeeding academies.

ACADEMY, in antiquity, a garden, villa, or grove, situated within a mile of Athens, where Plato and his followers held their philosophical conferences. It took its name from one Academus, or Acedemus, who was the original owner of it, and made it a kind of gymnasium; he lived in the time of Thepheus; and, after his death, it retained his name, and was consecrated to his
Academies of his memory. Cimon embellished it with fountains, trees, and walks; but Sylla, during the siege of Athens, employed the very trees in making battering engines against the city. Cicero too had his villa, or place of retirement, near Pauzzolo, which he also named an academy, where he composed his Academical questions, and his book De natura dormum.

Academy, among the moderns, is most commonly used to signify a society of learned men established for the improvement of any art or science, and generally under the protection of a prince.

The first Academy we read of, was established by Charlemagne, at the instigation of Alcuin. It was composed of the chief wits of the court, the emperor himself being a member. In their academical conferences, every person was to give an account of what ancient authors he had read; and each even assumed the name of some ancient author who pleased him most, or some celebrated person of antiquity. Alcuin, from whole letters we learn these particulars, took that of Placens, the surname of Horace; a young lord, named Augulf, took that of Homer; Adelard, bishop of Corbie, was called Augustin; Riculpe, bishop of Mentz, was Dametas; and the king himself, David. This shows the mistake of some modern writers, who relate, that it was in conformity with the genius of the learned men of those times, who were great admirers of Roman names, that Alcuin took the name of Placcus Albinus.

Most nations have now their academies; but Italy has the greatest number.—The French have many flourishing academies, most of which were established by Louis XIV. —There are but few in Britain; and those of chief note go by a different name. See the article Society.

In giving an account of the principal Academies, it seems most proper to arrange them according to their subjects.

I. Medical Academies, as that of the Nature Curiosi in Germany; that founded at Palermo in 1645: another at Venice in 1701, which meets weekly in a hall near the grand hospital; another at Geneva in 1715, in the house of M. Le Clerc. The colleges of physicians at London and Edinburgh are also, by some, ranked in the number of academies.

The Academy of Nature Curiosi, called also the Leopoldine Academy, was founded in 1652, by Jo. Laur. Bauschius, a physician; who, in imitation of the English, published an invitation to all physicians to communicate their extraordinary cafes; and, meeting with success, was elected president. Their works were at first published separately; but in 1670 a new scheme was laid for publishing a volume of observations every year. The first volume appeared in 1684, under the title of Ephemeredes, and the work has been continued with some interruptions and variations of the title, &c. In 1687, the emperor Leopold took the society under his protection, granting the members several privileges, particularly that their presidents should be counts palatine of the holy Roman empire. This academy has no fixed residence, nor regular assemblies; instead of thefe, there is a kind of bureau, or office, first established at Breslaw, and afterwards removed to Nuremberg, where letters, observations, &c. from correspondents or members are taken in. The academy consists of a president, two adjutants or secretaries, and colleagues or Academicians, members without restriction. The colleagues, at their admission, oblige themselves to two things: first, to choose some object out of the animal, vegetable, or mineral kingdom, to handle, provided it had not been treated of by any colleague before: the second, to apply themselves to furnish materials for the annual Ephemerides. Each member to bear a symbol of the academy, in a gold ring; whereon, instead of a mote, is a book open, and, on the back thereof, an eye; on the other side the motto of the academy, Nunciam etiam.

II. Chirurgical Academies; as that instituted some years ago, by public authority, at Paris: the members of which were not only to publish their own and correpondents observations and improvements, but to give an account of all that is published on surgery, and to compose a complete history of the art, by their extracts from all the authors ancient and modern who have written on it. A question in surgery is annually proposed by the academy, and a gold medal of 200 livres value given to him who furnishes the most satisfactory answer.

Academy of Surgery at Vienna, was instituted some years ago by the present emperor, under the direction of the celebrated Brambilla. In this there were at first only two professors; and to their charge the instruction of 150 young men was committed, 30 of whom had formerly been surgeons in the army. But of late the number both of the teachers and pupils has been considerably increased. Gabrielli has been appointed to teach pathology and practice; Boecking, anatomy, physiology, and physics; Streit, medical and pharmaceutical surgery; Hunzowsky, surgical operations, midwifery, and the chirurgia forensica; and Plenk, chemistry and botany. To these has been added, Beindl, as professor and extraordinary professor of surgery and anatomy. Besides this, the emperor, with his usual liberality, has provided a large and splendid edifice in Vienna, which affords habitation both for the teachers, the students, pregnant women, patients for clinical lectures and servants. He has also purchased for the use of this academy a medical library, which is open every day: a complete set of chirurgical instruments; an apparatus for experiments; a collection of preparations in wax brought from Florence; and a variety of other useful articles. Adjoining to the building also there is a good botanical garden.

Among other parts of this institution, three prize medals, each of the value of 40 florins, are to be annually bestowed on those students who return the best answer to questions proposed the year before. These prizes are not entirely founded by the emperor, but are in part owing to the liberality of Brendellius, the protochirurgus at Vienna.

III. Ecclesiastical Academies; as that of Bologna in Italy instituted in 1687; employed in the examination of the doctrine, discipline, and history, of each age of the church.

IV. Cosmographical Academies; as that at Venice, called the Argonauti. This was instituted at the solicitation of F. Coronelli, for the improvement of geographical knowledge. Its design was to publish exact maps, both celestial and terrestrial, as well particular-
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Adventures of the Academies. — Each particular academy, together with geographical, historical, and astronomical descriptions. Each member, in order to defray the expense of such a publication, was to subscribe a proportional sum, for which they were to receive one or more copies of each piece published. For this end three societies are fetted; one under F. Moro, provincial of the minoritics in Hungary; another under the abbot Laurence at Rue Pavenne au Marais; the third under F. Baldigiani, Jefuit, professor of mathematics in the Roman college. The device of this academy is the terraqueous globe, with the motto Plus ultra; and at its expense all the globes, maps, and geographical writings of F. Coronelli have been published.

V. Academies of Sciences. — These comprehend such as are erected for improving natural and mathematical knowledge. They are otherwise called Philosophical and Physical academies.

The first of these was instituted at Naples, about the year 1560, in the house of Baptista Porta. It was called the Academy Scienzarum Naturae; and was succeeded by the Academy of Lyncei founded at Rome by Prince Frederic Cesi, towards the end of that century. Several of the members of this academy rendered it famous by their discoveries; among these was the celebrated Galileo. Several other academies were instituted about that time, which contributed greatly to the advancement of the sciences; but none of them comparable to that of the Lynceum.

Some years after the death of Toricelli, the Academy del Cimento made its appearance, under the protection of Prince Leopold, afterwards Cardinal de Medicis. Redi was one of its chief members; and the studies pursued by the rest may be collected from those curious experiments published in 1667, by their secretary Count Laurence Magulotti, under the title of Saggi di Naturali Esperienze; a copy of which was presented to the Royal Society, translated into English by Mr. Waller, and published at London in 4th.

The Academy degli Isquiti, afterwards incorporated into that of Della Tracia in the same city, followed the example of that of Del Cimento. Some excellent discoveries on physical and mathematical subjects, by Gemiliano Montenari, one of the chief members, were published in 1667, under the title of Perforis Fisico Mathematici.

The Academy of Raffano, in the kingdom of Naples, was originally an academy of Belles Letters; founded in 1540, and transformed into an Academy of Sciences in 1695 at the solicitation of the learned abbot Don Giacinto Gimmia; who being made president, under the title of Promoter General thereof, gave them a new set of regulations. He divided the academists into the following classes: Grammarians, Rhetoricians, Poets, Historians, Philosophers, Physicians, Mathematicians, Lawyers, and Divines, with a class apart for Cardinals and persons of quality. To be admitted a member, a man must have some degrees in the faculty. The members are not allowed to take the title of Academy; in the beginning of their books, a written permission from their president, which is not granted till the work has been examined by the censors of the academy; and the permission is the greatest honour the academy can confer, as they thereby adopt the work, and are answerable for it against all criticisms that may be made upon it. To this law the president or promoter himself is subject; and no academist is allowed to publish any thing against the writings of another without leave from the society.

Several other Academies of Sciences have been founded in Italy; but, for want of being supported by princes, did not continue long. The loss of them, however, was abundantly repaired by the institution of others still subsisting; such as, the Academy of Philosophers at Verona; of Rancini at Pavia, where a learned discourse on the origin of springs was delivered by Sig. Vallisniere, first professor of physics in the university of that city, and which was afterwards printed. To the Academy of the Mastri de Reggio, at Modena, the fame Sig. Vallisniere presented an excellent discourse on the scale of created beings, since inferred in his history of the generation of man and animals printed at Venice in the year 1721. F. Mersenne is said to have given the first idea of a philosophic academy in France, towards the beginning of the 17th century, by the conferences of naturalists and mathematicians occasionally held at his lodgings; at which Gaffendi, Des Cartes, Hobbes, Roberval, Pascal, Blondel, and others assisted. F. Mersenne proposed to each certain problems to examine; or certain experiments to be made. These private assemblies were succeeded by more public ones, formed by Mr Montmort, and Mr Thevenot the celebrated traveller. The French example animated several Englishmen of di&ine learning and erudition to erect a kind of philosophical academy at Oxford, towards the close of Oliver Cromwell’s administration; which, after the restoration, was erected into a Royal Society. See Society. The English example, in its turn, animated the French. Lewis XIV. in 1666, assisted by the counsels of Mr Colbert, founded an academy of sciences at Paris, with a sufficient revenue to defray the charge of experiments, and salaries to the members.

Royal Academy of Sciences. — After the peace of the Pyrenees, Lewis XIV. being desirous of establishing the arts, sciences, and literature, upon a solid foundation, directed M. Colbert to form a society of men of known abilities and experience in the different branches, who should meet together under the king’s protection, and communicate their respective discoveries. Accordingly Mr Colbert, having conferred with those who were at that time most celebrated for their learning, resolved to form a society of such persons as were conversant in natural philosophy and mathematics, to join to them other persons skilled in history and other branches of erudition, along with those who were entirely engaged in what are called the Belles Lettres, grammar, eloquence, and poetry. The geometricians and natural philosophers were ordered to meet on Tuesdays and Saturdays, in a great hall of the king’s library, where the books of mathematics and natural philosophy were contained; the learned in history to assemble on Mondays and Tuesdays, in the hall where the books of history are contained; and the classes of Belles Lettres to assemble on Wednesdays and Fridays. All the different classes were likewise ordered to meet together upon the first Tuesday of every month; and, by their respective secretaries, make a report of the proceedings of the foregoing month.

In a short time, however, the classes of History, Belles
Academies: Belles Lettres, &c. were united to the French Academy, which was originally instituted for the improvement and refining the French language; so that the royal Academy contained only two classes, viz. that of natural philosophy and mathematics.

In the year 1696, the king, by a proclamation dated the 26th of January, gave this Academy a new form, and put it upon a more respectable footing. It was now to be composed of four kinds of members, viz. honorary, penitential, associates, and eleves. Their last were a kind of pupils, or scholars, each of whom was attached to one of the penitentiaries. The first classes to contain ten persons, and each of the rest twenty. The honorary academists to be all inhabitants of France; the penitentiaries all to reside at Paris; eight of the associates allowed to be foreigners; and the eleves all to live at Paris. The officers to be, a president named by the king, out of the classes of honorary academists; and a secretary and treasurer to be perpetual. Of the penitentiaries, three to be geometricians, three astronomers, three mechanics, three anatomists, three chemists, three botanists, and the remaining two to be secretary and treasurer. Of the twelve associates, two to apply themselves to geometry, two to botany, and two to chemistry. The eleves to apply themselves to the same kind of science with the penitentiaries they were attached to; and not to speak except when called by the president. No regular or religious to be admitted, except into the class of honorary academists; nor any person to be admitted either for associate or penitential, unless known by some considerable printed work, some machine, or other discovery. The assemblies were held on Wednesdays and Saturdays, unless either of them happened to be a holiday, and then the assembly was held on the preceding day. To encourage the members to pursue their labours, the king engaged not only to pay the ordinary pensions, but even to give extraordinary gratifications, according to the merit of their respective performances; furnishing with the expense of the experiments and other inquiries necessary to be made. If any member gave in a bill of charges of experiments he had made, or defiring the printing of any book, and brought in the charges of gravelling, the money was immediately paid by the king, upon the president's allowing and signing the bill. So, if an anatomist required live tortoises, for instance, for making experiments about the heart, &c. as many as he pleased were brought him at the king's charge. Their motto was, *invenit et perfect.*

In the year 1716, the duke of Orleans, then regent, made an alteration in their constitution; augmenting the number of honories, and of associates capable of being foreigners, to 12; admitting regulars among such associates; and supposing the classes of eleves, as it appeared to be attended with some inconveniences, particularly that of making too great an inequality among the chemists, and being productive of some misunderstandings and animosities among the members. At the same time he created other two classes; one consisting of 12 adjutants, who, as well as the associates, were allowed a deliberative voice in matters relative to science; and the other six free associates, who were not attached to any particular science, nor obliged to pursue any particular work.

Since its re-establishment in 1696, this academy has been very exact in publishing, every year, a volume containing either the works of its own members, or such memoirs as have been composed and read in the academy during the course of that year. To each volume is prefixed the history of the academy, or an extract of the memoirs, and, in general, of whatever has been read or said in the academy; at the end of the history, are the catalogues of such academists as have died that year.—M. Fouillée et Deslay, counselor to the parliament of Paris, founded two prizes, one of 2500, and the other of 2000 livres, which are alternately distributed by the parliament every year; the subject for the first must relate to physical astronomy, and that for the latter to navigation and commerce.

Notwithstanding the advantages which the members of this academy enjoy over others, in having their expenses defrayed, and even being paid for their time and attendance, they have fallen under some imputations, particularly that of plagiarism, or borrowing their neighbour's inventions; but with what justice we do not say.

The French have also considerable academies in most of their great cities; as, at Montpellier, a royal academy of sciences on the like footing as that at Paris, being as it were a counter part thereof; at Toulouse, an academy under the denomination of Lanternists; others at Nantes, Arles, Lyons, Dijon, Bourdeaux, &c.

The Royal Academy of Sciences at Berlin was founded in 1700, by Frederic II. king of Prussia, on the model of that of England; excepting that, besides natural knowledge, it likewise comprehends the Belles Lettres. In 1716, it was ordained that the president shall be one of the counsellors of state, and nominated by the king. The members were divided into four classes; the first for prosecuting physics, medicine, and chemistry; the second for mathematics, astronomy, and mechanics; the third for the German language and the history of the country; the fourth for oriental learning, particularly as it may concern the propagation of the gospel among infidels. Each class to elect a director for themselves, who shall hold his post for life. The members of any of the classes have free admission into the assemblies of any of the rest.

The great promoter of this institution was the celebrated Mr Leibnitz, who accordingly was named the first director. The first volume of their transactions was published in 1710, under the title of *Miscellanea Berolinensia*; and though they received but few marks of the royal favour for some time, they continued to publish new volumes in 1723, 1725, 1724, and 1740. At last, however, Frederic III. the late king of Prussia, gave new vigour to this academy, by inviting to Berlin such foreigners as were most distinguished for their merit in literature, and encouraged his subjects to prosecute the study and cultivation of the sciences by giving ample rewards; and thinking that the academy, which till that time had had some minifter or opulent nobleman for its president, would find an advantage in having a man of letters at its head, he conferred that honour on M. Maupertuis. At the same time, he gave a new regulation to the academy, and took upon himself the title of its protector.

The academists hold two public assemblies annually; one in January, on the late king's birthday; and the
At the latter of these is given, as a prize, a gold medal of 50 ducats value: the subject for this prize is successively, natural philosophy, mathematics, metaphysics, and erudition.

The Imperial Academy of Sciences at Peterburgh was projected by Czar Peter the Great. That great monarch having, during his travels, observed the advantage of public societies for the encouragement and promotion of literature, formed the design of founding an academy of sciences at St Peterburgh. By the advice of Wolf and Leibnitz, whom he consulted on this occasion, the society was regulated, and several learned foreigners were invited to become members. Peter himself drew the plan, and arranged the details of the academy; and on the 27th of Feb. 1724, but was prevented, by the suddenness of his death, from carrying it into execution. His decease, however, did not prevent its completion: for on the 21st of December 1725, Catherine I. established it according to Peter's plan; and on the 27th of the same month the society was first assembled. On the 1st of August 1726, Catherine honoured the meeting with her presence, when professor Bullinger, a German naturalist of great eminence pronounced an oration upon the advances made by the lodestone and needle for the discovery of the longitude.

The fund which the empress settled a fund of 49821. per annum for the support of the academy; and fifteen members, all eminent for their learning and talents, were admitted and pensioned, under the title of Professors, in the various branches of literature and science. The most distinguished of these professors were Nicholas and Daniel Bernoulli, the two De Liles, Bullinger, and Wolf.

During the short reign of Peter II. the salaries of the members were discontinued, and the academy was utterly neglected by the court; but it was again patronised by the empress Anne, who even added a feminary for the education of youth, under the superintendence of the professors. Both institutions flourished for sometime under the direction of Baron Korff; but upon his death, towards the latter end of Anne's reign, an ignorant person being appointed president, many of the most able members quitted Russia. At the accession of Elizabeth, new life and vigour were again restored to the academy: the original plan was enlarged and improved; some of the most learned foreigners were again drawn to Peterburgh; and, what was considered as a good omen for the literature of Russia, two natives, Lomonosof and Rumovkly, men of genius and abilities, who had prosecuted their studies in foreign universities, were enrolled among its members. The annual income was increased to 10,659l. and soon afterwards the new institution took place.

The present empress Catharine III. with her usual zeal for promoting the diffusion of knowledge, has taken this useful society under her more immediate protection. She has altered the court of directors greatly to the advantage of the whole body; she has corrected many abuses, and has infused a new spirit into their researches. By her majesty's particular recommendation, the most ingenious professors have visited the various provinces of her vast dominions; and as the fund of the academy was not sufficient to supply the whole expense of these several expeditions, the empress be-

Academies. other in May, on the day of his accession to the throne.

Academies. The purpose and intent of these travels will appear from the instructions given by the academy to the several persons who were engaged in them. They were ordered to pursue their inquiries upon the different sorts of earths and waters; upon the best methods of cultivating the barren and desart spots; upon the local disorders incident to men and animals, and the most efficacious means of relieving them; upon the breeding of cattle, and particularly of sheep; on the rearing of bees and silk-worms; on the different places and objects for fishing and hunting; on minerals; on the arts and trades; and on forming a Flora Russica, or collection of indigenous plants: they were particularly instructed to redify the longitude and latitude of the principal towns; to make astronomical, geographical, and meteorological observations; to trace the course of the rivers; to take the most exact charts; and to be very distinct and accurate in remarking and describing the manners and customs of the different people, their dress, languages, antiquities, traditions, history, religion; and, in a word, to gain every information which might tend to illustrate the real state of the whole Russian empire.

In consequence of these expedititions, perhaps no country can boast, within the space of so few years, such a number of excellent publications on its internal state, on its natural productions, on its topography, geography, and history; on the manners, customs, and languages of the different people, as have issued from the press of this academy.

The first transactions of this society were published in 1728, and intitled Commentarii Academiae Scientiarum Imperialis Petropolitanae ad an. 1726, with a dedication to Peter II. The publication was continued under this form until the year 1747, when its transactions were called Novi Commentarii Academiarum, &c. In 1777 the academy again changed the title into Acta Academiae Scientiarum Imperialis Petropolitanae, and likewise made some alteration in the arrangement and plan of the work. The papers, which had been hitherto published in the Latin tongue, are now written either in that language or French; and a preface is added, intitled Partie Historique, which contains an account of its proceedings, meetings, admission of new members, and other remarkable occurrences. Of the Commentaries, 14 volumes were published: the first of the New Commentaries made its appearance in 1750, and the twentieth in 1776. Under the new title of Acta Academiae, several volumes have been given to the public, and two are printed every year. These transactions abound with ingenious and elaborate disquisitions upon various parts of science and natural history, and which reflect the greatest honour upon their authors; and it may not be an exaggeration to assert, that no society in Europe has more distinguished itself for the excellence of its publications, and particularly in the more abstruse parts of the pure and mixed mathematics.

The academy is still composed, as at first, of fifteen professors, besides the president and director. Each of these professors has a house and an annual stipend from 200l. to 600l. Besides the professors, there are four adjutants, who are pensioned, and who are present at the
Academies.

The Academy of Sciences at Bologna, called the Instituto di Bologna, was founded by count Martigelli in 1712, for the cultivating of physics, mathematics, medicine, chemistry, and natural history. Its history is written by M. de Limiers, from memoirs furnished by the founder himself.

The Academy of Sciences at Stockholm, or Royal Swedish Academy, owes its institution to fix persons of distinguished learning, among whom was the celebrated Linnaeus: they originally met on the 2d of June 1739, formed a private society, in which some dissertations were read; and in the latter end of the same year their first publication made its appearance. As the meeting continued and the members increased, the society attracted the notice of the king, and was, on the 31st of March 1741, incorporated under the name of the Royal Swedish Academy. Not receiving any pension from the crown, it is only under the protection of the king, being directed, like the Royal Society, by its own members. It has now a large fund, which has chiefly arisen from legacies and other donations; but a professor of experimental philosophy, and two secretaries, are still the only persons who receive salaries. Each of the members resides at Stockholm becomes president by rotation, and continues in office during three months. There are two species of members, native and foreign: the election of the former is held in April, and of the latter in July; no money is paid at the time of admission. The dissertations read at each meeting are collected and published four times in the year; they are written in the Swedish language, and printed in octavo, and the annual publications make a volume. The first 40 volumes, which were finished in 1779, are called the Old Transactions; for in the following year the title was changed into that of New Transactions. The king is sometimes present at the ordinary meetings, and particularly at the annual assembly in April for the election of members. Any person who sends a treatise which is thought worthy of being printed, receives the transcriptions for that quarter gratis, and a silver medal, which is not esteemed for its value, being worth only three shillings, but for its rarity and the honour conveyed by it. All the papers relating to agriculture are put forth separately under the title of Geonomica. Annual premiums, in money and gold medals, principally for the encouragement of agriculture and inland trade, are also distributed by the academy. The fund for these prizes is supplied from private donations.

The Royal Academy of Sciences at Copenhagen, owes its institution to the zeal of fix literati, whom Christian VI. in 1742, ordered to arrange his cabinet of medals. The count of Holstein was the first president; and the six persons who first formed the design, were John Gram, Joachim Frederic Ramus, Christian Louis Scheid, Mark Wolsdicky, Eric Pontopidan, and Bernt Moehlman. These persons occasionally meeting for that purpose, extended their designs; associated with them others who were eminent in several branches of science; and forming a kind of literary society, employed themselves in searching into, and explaining the history and antiquities of their country. The count of Holstein warmly patronized this society, and recommended it so strongly to Christian VI. that, in 1743, his Danish Majesty took it under his protection, called it the Royal Academy of Sciences, endowed it with a fund, and ordered the members to join to their former pursuits, natural history, physics, and mathematics. In consequence of the royal favour, the members engaged with fresh zeal in their pursuits; and the academy has published 15 volumes in the Danish language, some whereof have been translated into Latin.

American Academy of Sciences, was established in 1760 by the council and house of representatives in the commonwealth of Massachusetts's Bay for promoting the knowledge of the antiquities of America, and of the natural history of the country; for determining the use of which its various natural productions might be applied; for encouraging medicinal discoveries, mathematical disquisitions, philosophical inquiries and experiments, astronomic, meteorological, and geographical observations, and improvements in agriculture, manufactures, and commerce; and in short, for cultivating every art and science which may tend to advance the interest, honour, dignity, and happiness, of a free, independent, and virtuous people. The members of this academy are never to be more than 200, nor less than 40.

VI. Academies or Schools of Arts: as that at Peterburgh, which was established by the empress Elizabeth, at the suggestion of count Shuvalof, and annexed to the academy of sciences: the fund was L. 4000 per annum, and the foundation for 40 scholars. The present empress has formed it into a separate institution, enlarged the annual revenue to L. 12,000, and has augmented the number of scholars to 500; she has also constructed, for the use and accommodation of the members, a large circular building, which fronts the Neva. The scholars are admitted at the age of 18, and continue until they have attained that of 55: they are clothed, fed, and lodged, at the expense of the crown. They are all instructed in reading and writing, arithmetic, the French and German languages and drawing. At the age of 14 they are at liberty to choose any of the following arts, divided into four classes. 1. Painting in all its branches of history, portraits, battles and landscapes; architecture; Mosaic; enamelling; &c. 2. Engraving on copperplates, seal-cutting, &c. 3. Carving in wood, ivory and amber. 4. Watch-making, turning, instrument-making, casting statues in bronze and other metals, imitating gems and medals in paste and other materials.
Academies other compositions, gilding and varnishing. Prizes are annually distributed to those who excel in any particular art; and from those who have obtained four prizes, twelve are selected, who are sent abroad at the charge of the empress. A certain sum is paid to defray their travelling expenses; and when they are settled in any town, they receive an annual salary of £60, which is continued during four years. There is a small assortment of paintings for the use of the scholars; and those who have made great progress are permitted to copy the pictures in the empress's collection. For the purpose of design, there are models in platter of the best antique statues in Italy, all done at Rome, of the same size with the originals, which the artists of the academy were employed to cast in bronze.

The Royal Academy of Arts in London, was instituted for the encouragement of Designing, Painting, Sculpture, &c. &c. in the year 1768. This academy is under the immediate patronage of the king, and under the direction of 40 artists of the first rank in their several professions. It furnishes in winter, living models of different characters to draw after; and, in summer, models of the same kind to paint after. Nine of the ablest academicians are annually elected out of the 40, whose business is to attend by rotation, to set the figures, to examine the performance of the students, and to give them necessary instructions. There are likewise four professors, of Painting, of Architecture, of Anatomy, and of Perspective, who annually read public lectures on the subjects of their several departments; besides a president, a council, and other officers. The admission to this academy is free to all students properly qualified to reap advantage from the studies cultivated in it; and there is an annual exhibition of paintings, sculptures, and designs, open to all artists of distinguished merit.

The Academy of Painting and Sculpture at Paris. This took its rise from the disputes that happened between the master painters and sculptors in that capital; in consequence of which, M. Le Brun, Sarazin Cornelle, and others of the king's painters, formed a design of instituting a particular academy; and having procured a patent to the king, obtained an arrest dated Jan. 20, 1648. In the beginning of 1655, they obtained from cardinal Mazarin a brevet, and letters patent, which were registered in parliament; in gratitude for which favour they chose the cardinal for their protector, and the chancellor for their vice-protector. In 1663, by means of M. Colbert, they obtained a pension of 4000 livres. The academy consists of a protector; vice-protector; a director; a chancellor; four rectors; four treasurers; four professors, one of which is professor of anatomy, and another of geometry; several adjuncts and counsellors, an historiographer, a secretary, and two uffers.

The Academy of Painting holds a public assembly every day for two hours in the afternoon, to which the painters resort either to design or to paint, and where the sculptors model after a naked person. There are 12 professors, each of whom keeps the school for a month; and there are 12 adjuncts to supply them in case of need. The professor upon duty places the naked model, as he thinks proper, and lets him in two different attitudes every week. This is what tlicy call "setting the model." In one week of the month he sets two models together, which is called "setting the group." The paintings and models made after this model, are called "academy" or "academy-figures." They have likewise a woman who stands for a model in the public school. Every three months, three prizes for design are distributed among the eleve or disciples; two others for painting, and two for sculpture every year.

There is also an Academy of Painting, Sculpture, &c. at Rome, established by Lewis XIV. wherein those who have gained the annual prize at Paris are intended to be three years entertained at the king's expense, for their further improvement.

The Academy of Architecture, established by M. Colbert in 1671, consisting of a company of skilful architects, under the direction of the superintendent of the buildings.

The Academy of Dancing, erected by Lewis XIV. with privileges above all the rest.

VII. Academies of Law; as that famous one at Berne, and that of the Sittenes at Bologna.

VIII. Academies of History and Painting, as the Royal Academy of Portuguese History at Lisbon. This academy was established by king John V. in 1720. It consists of a director, four censors, a secretary, and 50 members; to each of whom is assigned some part of the ecclesiastical or civil history of the nation, which he is to treat either in Latin or Portuguese. In the church-history of each diocese, the Prelates, bishops, council, churches, manuscripts, academies, persons illustrious for fagacity or learning, places famous, for miracles or relics, must be distinctly related in twelve chapters. The civil history comprises the transactions of the kingdom from the government of the Romans down to the present time. The members who reside in the country are obliged to make collections and extracts out of all the registers, &c. where they live. Their meetings to be once in 15 days.

A medal was struck by this academy in honour of their prince: the front of which was his effigy, with the inscription Johannes V. Lustororum Rex; and, on the reverse, the same prince is represented standing, and holding History almost prostrate before him, with the legend Historia Restituta. Underneath are the following words in abbreviation: REGia ACADemia Hist. Soria LUSITane, INSTI. Tu 6. Idus December MDCCXX.

Academy of Swedish History at Tubingen, was lately established by some learned men, for publishing the best historical writings, the lives of the chief historians, and compiling new memoirs, on the several points and periods thereof.

IX. Academies of Astronomers; as that at Cortona in Italy, and at Upsal in Sweden. The first is designed for the study of Heturian antiquities; the other for illustrating the northern languages, and the antiquities of Sweden, in which notable discoveries have been made by it. The head of the Heturian academy is called Lucaomon, by which the ancient governors of the country were distinguished. One of their laws is to give audience to poets only one day in the year; another is to fix their fees, and impose a tax of a differentiation on each member in his turn.

The Academy of Medals and Inscriptions at Paris was set on foot by M. Colbert, under the patronage of Lewis XIV. in 1663, for the study and explanation of
Academies of ancient monuments, and perpetuating great and memorable events, especially those of the French monarchy, by coins, reliques, inscriptions, &c. The number of members at first was considered as four or five, chosen out of those of the French academy; who met in the library of Mr. Colbert, from whom they received his majesty's orders. The days of their meetings were not determined; but generally they met on Wednesdays, especially in the winter season: but, in 1691, the king having given the inspection of this academy to M. de Pontchartrain comptroller general, &c. he fixed their meetings on Tuesdays and Saturdays.

By a new regulation, dated the 16th of July 1701, the academy was composed of ten honorary members; ten affiliates, each of whom had two declarative voices; ten penjuniaries; and ten scholars, or pupils. They then met every Tuesday and Wednesday, in one of the halls of the Louvre; and had two public meetings yearly, one the day after Martinmas and the other the 16th after Easter. The clasps of scholar have been suppressed, and united to the associates. The king nominate their president and vice-president yearly; but their secretary and treasurer are perpetual. The rest are chosen by the members themselves, agreeably to the constitutions on that behalf given them.

One of the first undertakings of this academy, was to compose by means of medals, a connected history of the principal events of Lewis XIV's reign; but in this design they met with great difficulties, and of consequence it was interrupted for many years; but at length it was completed down to the advancement of the duke of Anjou to the crown of Spain.

In this celebrated work, the establishment of the academy itself was not forgot. The medal on this subject represents Mercury sitting, and writing with an antique stylus on a table of brass, he leans with his left hand upon an urn full of medals, and at his feet are several others placed upon a card: the legend, Revera geoffarum fide et honora; and on the exergue, Academia regia inscriptiorm et numismatum, infitit in MDC.LXIII., signifying that the Royal Academy of medals and inscriptions, founded in 1663, ought to give to future ages a faithful testimony of all great actions. Besides this work, we have several volumes of their memoirs; and their history, written and continued by their secretaries.

X. Academies of Belles Lettres, are those where, in eloquence and poetry are chiefly cultivated. These are very numerous in Italy, and not uncommon in France.

The Academy of Umidi at Florence has contributed greatly to the progress of the sciences by the excellent Italian translations given, by some of its members, of the ancient Greek and Latin historians. Their chief attention is to the Italian poetry, at the same time that they have applied themselves to the polishing of their language, which produced the Academy del la Crusca.

The Academy of Humanists, Umoristi, had its origin at Rome from the marriage of Lorenzo Marcini, a Roman gentleman; at which several persons of rank were present; and, it being carnival time, to give the ladies some diversion, they took themselves to the executing of verses, sonnets, speeches, extempore, and afterwards premeditatedly; which gave them the denomination of Bili Humorist After some experience, composing more and more into unison, they resolved to form an Academy of Belles Lettres; and changed the title of Bili Humorist for that of Humanists: choosing for their device, a cloud, which, after being formed of exhalations from the salt waters of the ocean, returns in a gentle sweet shower; with this motto from Lucretius, Redi against dali.

In 1690, the Academy of Arcadi was established at Rome, for reviving the study of Poetry and of the Belles Lettres. Besides most of the polite wits of both sexes in Italy, this academy comprehends many princes, cardinals, and other ecclesiastics; and, to avoid disputes about pre-eminence, all appear masked after the manner of Arcadian shepherds. Within ten years from its first establishment, the number of Academys amounted to six hundred. They hold assemblies seven times a year in a mead or grove, or in the gardens of some noblemen of distinction. Six of these meetings are employed in the recitation of poems and verses of the Arcadi residing at Rome; who read their own compositions; except ladies and cardinals, who are allowed to employ others. The seventh meeting is set apart for the compositions of foreign or absent members.

This academy is governed by a Cuffos, who represents the whole society, and is chosen every four years, with a power of electing 12 others yearly for his assistance. Under these are two sub-custodes, one vicar or pro-custos, and four deputies or superintendants, annually chosen. The laws of the society are immutable, and bear a near resemblance to the ancient model.

There are five manners of electing members. The first is by acclamation. This is used when sovereign princes, cardinals, and ambassadors of kings, desire to be admitted; and the votes are then given viva voce. The second is called numeration. This was introduced in favour of ladies and academical colonies, where the votes are taken privately. The third representation, was established in favour of colonies and universities, where the young gentrty are bred; who have each a privilege of recommending one or two members privately to be balloted for. The fourth, suffrage; whereby new members are substituted in the room of those dead or expelled. The last, definition whereby, when there is no vacancy of members, persons of poetical merit have the title of Arcadi conferred upon them till such time as a vacancy shall happen. All the members of this body, at their admission, assume new pastoral names, in imitation of the shepherds of Arcadia. The academy has several colonies of Arcadi in different cities of Italy, who all regulated after the same manner.

XI. Academies of Languages; called, by some, Grammatical Academies.

The Academia della Crusca at Florence, famous for its vocabulary of the Italian tongue, was formed in 1582, but scarce heard of before the year 1585, when it became noted for a dispute between Tasso and several of its members. Many authors confound this with the Florentine academy. The difcourses which Toricelli, the celebrated disciple of Galileo, delivered in the assemblies, concerning levity, the wind, the power of percussion, mathematics, and military architecture, are a proof of...
The Academy of Prussia had its rise in 1617, as an assembly of several princes and nobility of the country, who met with a design to reform and perfect the German tongue. It flourished long under the direction of princes of the empire, who were always chosen presidents. In 1668 the number of members arose to upwards of 900. It was prior in time to the French academy, which only appeared in 1629, and was not established into an academy before the year 1635. Its history is written in the German tongue by George Neumack.

The French Academy, which had its rise from a meeting of men of letters in the house of M. Conrart, in 1629, in 1635, it was erected into an academy, by Cardinal Richilien, for refining and ascertaining the French language and style. The number of its members are limited at 40; out of whom a director, chancellor, and secretary, are to be chosen: the two former hold their post for two months, the latter is perpetual. The members of this academy enjoy several privileges and immunities, among which is that of not being obliged to answer before any court but that of the king's household. They meet three times a week in the Louvre; at breaking up, 40 silver medals are distributed among them, having on one side the king of France's head, and on the reverse, Protecteur de l'Académie, with laurel, and this motto, À l'Innocence. By this distribution, the attendance of the Academiciis is secured, those who are present receiving the surplus otherwise intended for the absent. To elect or expel a member, at least 18 are required; nor can any be chosen unless by petition for it: by this expedient, the affront of refusals from persons elected is avoided. Religious are not admitted; nor can any nobleman, or person of distinction, be admitted on another footing than as a man of letters. None are to be expelled, except for base and dishonest practices; and there are but two instances of such expulsions, the first of M. Granier for refusing to return a deposit, the other of the Abbé Furet for plagiarism. The design of this academy was to give not only rules, but examples, of good writing. They began with making speeches on subjects taken at pleasure, about 20 of which were printed. They met with great opposition from the parliament at their first institution; it being two years before the patents granted by the king were registered. They have been severely satirized, and their style has been ridiculed as everything instead of refining the French language. They are also charged with having forfeited the world by flattery, and having exhausted all the topics of panegyrick in praise of their founder; it being a duty incumbent on every member, at his admission, to make a speech in praise of the king, the cardinal, the chancellor Segnier, and the person in whom place he is elected. The most remarkable work of this academy is a dictionary of the French tongue; which, after 50 years spent in settling the words and phrases to be used in writing, was at last published in 1694.

The foundation of an Academy similar to the above, has been proposed at Peterburgh, by the learned princes Dalsko: it is to consist of 60 members. The plan has been approved by the emperors, who has already given a fund for its support and establishment.

The Royal Spanish Academy at Madrid held its first meeting in July 1713, in the palace of its founder, the duke d'Escalonza. It consisted of eight academicians, including the duke, to which number 14 others were afterwards added, the founder being chosen president or director. In 1714, the king granted them his confirmation and protection. Their device is a crucible in the middle of the fire, with this motto, Lintia, Fyos, y de Efplendor: "it purifies, fixes, and gives brightness." The number of members is limited to 24: the duke d'Escalonza to be director for life, but his successors chosen yearly, and the secretary to be perpetual. Their object, as marked out by the royal declaration, was to cultivate and improve the national language: they were to begin with choosing carefully such words and phrases as have been used by the best Spanish writers, noting the Low, barbarous, or obsolete ones; and composing a dictionary wherein these may be distinguished from the former.

Academy is also a term for schools and other seminaries of learning among the Jews, where their rabbins and doctors instructed their youth in the Hebrew language, and explained to them the Talmud and the secrets of the cabala: Those of Tiberias and Babylon have been the most noted.

The Romans had a kind of military academies, established in all the cities of Italy, under the name of Cami Martis. Here the youth were admitted to be trained for war at the public expense. The Greeks, beside academies of this kind, had military professors called Tactic, who taught all the higher offices of war, &c. &c.

Academy is often used to denote a kind of collegiate seminary, where youth are instructed in arts and sciences. There is one in Portsmouth for teaching navigation, drawing, &c.; another at Woolwich, for fortification, gunnery, &c.—Besides these, there are numerous academies, especially in London, for teaching mathematics, languages, writing, accounts, drawing, and other branches of learning.

The nonconformist ministers, &c. are bred up in private academies; as not approving the common university education. The principal of their academies are those in London, Daventry, and Warrington.

Academy is likewise a name given to a riding-school, where young gentlemen are taught to ride the great hourse, &c. and the ground allotted is usually called the Manege.

Academy Figure, a drawing of a naked man or woman, taken from the life; which is usually done on paper with red or black chalk, and sometimes with pastil or crayons. See Academy, No. VI. par. 4. supra.

ACADIE, or Academy, in geography, a name formerly given to Nova Scotia, or New Scotland. See Nova Scotia.

ACENA, in antiquity, a Grecian measure of length, being a ten feet-rode, used in measuring their lands.
ACANTHA, in botany, a genus of the monogynia order belonging to the tetradria class of plants; the characters of which are these: The calyx is a perianthium consisting of four leaves, which are ovate, concave, equal, and persistent; there is no corolla. The flamina consists of four equal middle-sized filaments opposite to the calyx; the anthers are quadrangular, thin, erect; the pistillum has an inversely-ovate hilped germ; the style is small, and inflected on one side; and the stigma is a small thickish coloured membrane, divided into many segments. The pericarpium is an inversely-ovated dry one-celled berry covered with prickles bent backwards; the seed is single. There is only one species, a native of Mexico.

ACAjou, or Cashew-nut-tree. See Anacardium.

ACALANDRUS, a river falling into the bay of Tarentum, not far from the Metapontum, (Pliny, Strabo); now Finicia de Rofsio.

ACALEPTIC, in ancient proflity, a complete vixte.

ACALYPHA, the three-seeded Mercury, a genus of plants belonging to the monotecta monadepha class. The characters of this genus are the following.—Male flowers crowded above the female ones; The calyx is a three or four-lobed perianthium, the leaves roundish, concave, and equal; The corolla is wanting: The flamina have from 6 to 18 filaments, which are short, crowded, and connected at the base; the anthers are roundish.—Female flowers fewer, placed beneath, and received into a large divided involucre: The calyx is a perianthium, consisting of three leaves, which are concave, converging, small, and persistent: No corolla: The pistillum has a roundish germ; the style is three, branchy, often interrupted, and long; the stigmate are simple: The pericarpium has a roundish trifoliated trilocular capsule, the valvulgate gaping two ways: The seeds are solitary, roundish, and large.—This genus ranks in the 38th natural order, Triococca. There are five species, all natives of Virginia.

ACAMANTIS (the ancient name of the island of Cyprus), taken from one of its promontories situated to the west, and called Acanas. Teos in Ionia was also called thus from Acanus the founder.

ACAMAS, Acamantis (anc. geog.), the west promontory of the island of Cyprus, from whence it took its ancient name: now Cape Paphus or Epiphania, where formerly was a town of the same name, now a village called Crefico.

Acamas, son of Theseus, followed the rest of the Greek princes to the siege of Troy; and was deputed, with Diomedes, to the Trojans, in order to get Helen restored. Laocoon, Priam's daughter, fell in love with him, stole a night with him, and had a son by him called Munitus. He was one of the heroes who concealed themselves in the wooden horse. One of the tribes of Athens was called Acamantides from him, by the appointment of the oracle; and he founded a city in Phrygia Major, called Acamanthus. Homer mentions two other heroes of this name; one a Thracian prince who came to succour Priam, another a son of Antenor.

ACANACEOUS PLANTS, such as are armed with prickles.

ACANGIS, that is, Ravagers or Adventurers; a name which the Turks give their huskars or light troops, who are generally sent out in detachments to procure intelligence, harass the enemy, or ravage the country.

ACANTHA, in botany, the prickie of any plant; in zoology, a term for the spine or prickly fins of fishes.

ACANTHABOLUS, in surgery, an instrument for pulling thorns, or the like, out of the skin.

ACANTHINE, any thing resembling or belonging to the herb acanthus. Acantline garments, among the ancients, are said to be made of the down of thistles; others think they were garments embroidered in imitation of the acanthus.

ACANTHOPTERYGIOUS FISHES, a term used by Linnaeus and others for those fishes whose back-fins are hard, offensive, and prickly.

ACANTHOS, a town of Egypt, near Memphis, (Pliny); now Bifauta. Also a maritime town of Macedonia, to the west of mount Athos, a colony of Andrians, (Thucydides, Ptolemy); now Kritos; near which was shown Xerxes's ditch, of seven fadias, in order to separate mount Athos from the continent, and convey his ships, without doubling Athos, into the Singitic Bay. Acanthus, is also a town of Epirus.

ACANTHUS, bear's-breech, or bract-wrapping, in botany: a genus of the angiosperma order, belonging to the didynamia class of plants; and ranking in the 4th natural order, Perifome. The generic characters are: The calyx is a perianthium with leaflets of three alternate pairs unequal and persistent: The corolla is one-petal'd and unequal; the tubus very short, closed with a beard; no upper-lip, the under-one very large, flat, straight, very broad, three-lobed, and obulate: The flamina have four subulate filaments shorter than the corolla; the two superior rather longer, recurved, and incurved at the top; the antherae are oblong, compressed, obtuse, lateral, parallel, and villous before: the pistillum has a conic germ; a filiform style, the length of the flamina; and two acute lateral stigmata: The perianthium is an acutely-ovate bilocular capful, with a lateral partition: The seeds one or two, fliehy and gibbous.

Species. 1. The mollis, or common bear's-breech, a native of Italy, is the sort that is used in medicine, and is supposed to be the volii acanthus of Virgil; and the leaves are famous for having given rise to the capital of the Corinthian columns. 2. The spinolus, or prickly bear's-breech; the leaves of which are deeply jagged in very regular order, and each segment is terminated with a sharp spine, as are also the toothed edges of the leaves and the embalmen of the flower, which renders it troublesome to handle them. 3. Illifolus, or shrubby bear's-breech, grows naturally in both the Indies. It is an evergreen shrub, which rises about for feet high; and is divided into many branches, garnished with leaves like those of the common holly, and armed with spines in the same manner: the flowers are white, and shaped like those of the common acanthus, but smaller. 4. The nigra, or Portugueal bear's-breech, with smooth flat-ruffled leaves of a vivid green colour, was discovered in Portugal by Dr Jaffrey of the royal garden at Paris. 5. The middle bear's-breech, with entire leaves, having spines on their border, is supposed to be the acanthus of Dioscorides.
ACARNANIA, the first country of Free Greece, or Greece Proper, bounded on the west by the Sinus Ambraeci, or Ambracian Gulf, and separated from Aetolia by the river Achelous on the east, and by the Sinus Ambraeci from Epirus. The people were called Accarniani, denoting persons unhewn; other Eoliots, to the east of the Achelous, being called Curetes (Homer) from being thorn. According to Lucian, they were noted for effeminacy and incontinence; hence the proverb, 

PORELLUS ACARNANIUS. This country was famous for an excellent breed of horses; so that AQAIPZMN, is a proverbial saying for a thing excellent in its kind. It is now called la Garnie et il Disporata.

ACARON, or ACARON, a town of Palestine, called Ekrin in Scripture. It was the boundary of the Philistines to the north; flood at some distance from the sea, near Bethheleth; and was famous for the idol of Baalzephub.

ACARUS, the Tick or Mite, a genus of insects belonging to the order of apsectra, or such as have no wings. The acarus has eight legs; two eyes, one on each side of the head; and two jointed tentaculas. The female is oviparous. Linnaeus enumerates 35 species; of which some are inhabitants of the earth, some of waters; some live on trees, others among stones, and others on the bodies of other animals, and even under their skin. The description of a few of the most remarkable will here suffice.

1. The siro, or cheese-mite, is a very minute species. To the naked eye, these mites appear like moving particles of dust: but the microscope discovers them to be perfect animals, having as regular a figure, and performing all the functions of life as perfectly, as creatures that exceed them many times in bulk. The principal parts of them are the head, the neck, and the body. The head is small in proportion to the body; and has a sharp snout, and a mouth that opens and shuts like a mole's. They have two small eyes, and are extremely quick-fanged; and when they have been once touched with a pin, you may easily perceive how cunningly they avoid a second touch. Their legs are each furnished at the extremity with two little claws, with which the animal very nicely takes hold of any thing. The hinder part of the body is plumy and bulgy; and ends in an oval form, from which there issue out a few exceeding long hairs. Other parts of the body are also beset with thin and long hairs. The males and females are easily distinguished in these little animals. The females are oviparous, as the louse and spider; and from their eggs the young are hatched in their proper form, without having any change to undergo afterwards. They are, however, when first hatched, extremely minute; and, in their growing to their full size, they cast their skins several times. These little creatures may be kept alive many months between two concave glasses, and applied to the microscope with pleasure. They are thus often seen in coitus, conjoined tail to tail; and this is performed by an incredibly swift motion. Their eggs, in warm weather, hatch in 12 or 14 days; but in winter they are much longer. These eggs are so small, that a regular comparison shows, that 90 millions of them are not so large as a common pigeon's egg. They are very voracious animals, and have often been seen to eat one another.
ACA

Acras. jaw forward and the other backward, and in this manner grinding their food; and after they have done feeding, they seem to chew the cud. — There are several varieties of this species found in different substances besides cheese; as in malt-dust, flour, oatmeal, &c. Those in malt-dust and oat-meal are much nimbler than the cheese-mites, and have more and longer hairs. There are also a sort of wandering mites, which range wherever there is anything they can feed on: They are often seen in the form of a white dust, and are not suspected to be living creatures. — The mite is called by authors, simply, Acras. It is an animal very tenacious of life, and will live months without food. Mr Lewenhoek had one which lived 11 weeks on the point of a pin, on which he had fixed it for examining by his microscope.

ACA

2. The fangulatus. The hinder part of the abdomen is crenated, the cutellum is oval and yellowish, and the head is triquet. It is a native of America, and sticks so fast on the legs of travellers, fucking their blood, that they can hardly be extracted.

3. The telarius is of a greenish yellow colour. It has a small sting or weapon, with which it wounds the leaves of plants, and occasions them to fold backward. They are very frequently to be met with in the autumn, inclosed in the folded leaves of the lime-tree.

4. The exulcerans, or itch-acarus, is a very small species: its body is of a figure approaching to oval, and lobated; the head is small and pointed; its colour is whitish, but it has two dusky fimbriar lines on the back. It has long feticaceous legs, but the two first are short. It is found in the pusules of the itch: authors in general have supposed that it caueth that disease; but others observe, that if this were so, it would be found more universally in those pusules. It is more probable that these only make a proper nidus for it. See, however, the article itch.

5. The batatas is of a blood-colour, and a little rough; the fore pair of legs are as long as the body. It inhabits the potatoes of Surinam.

6. The ovinus, or sheep-tick, has a flat body, of a roundish figure, but somewhat approaching to oval, and of a yellowish white colour, and has a single large round spot on the back: the anus is visible in the lower part of the body; the thorax is fcarce confpicuous; the head is very small and black; the mouth is bifid: the antennae are of a elevatet figure, and of the length of the front; the legs are short and black. It is common on sheep, and its excrements stain the wool green: it will live in the wool many months after it is torn from the animal.

7. The coleoptratorum, or acarus of infects, is extremely minute: its body is round, reddish, and covered with a firm and hard skin: the head is very small, the neck scarce visible: the legs are moderately long, the anterior pair longer than the others; it has a white-nets about the anus. It is frequent on the bodies of many insects, with which it infects, as the loafe does others; it runs very swiftly: the humble bee, and many other of the larger insects, are continually infected with it; but none so much as the common black beetle, which has thence been called the loafe beetle.

8. The bacarum, or fcarlet tree-mite, is a small species: its body is roundish, and the back not at all flattened, as it is in many others; the skin is smooth, shining, and glossy; and the whole animal seems distended, and ready to burst; the color is a bright red, but a little duiker on the sides than elsewhere: the head is very small, and the legs short; there is on each side a small dusky spot near the thorax, and a few hairs grow from different parts of the body. It is very common on trees, particularly on the currant, on the fruit of which we frequently see it running.

9. The longiporus, or red foon-acarus, is very small, and of a bright red colour; the body is round, and distended; the head is very small and pointed; the legs are moderately long, and of a paler red than the body; the antennae are much longer than in any other species. It is frequent about old stone-walls and on rocks, and runs very nimbly. See Plate 1.

10. The aquaticus is a small species: the body is of a figure approaching to an oval, and the back appears depressed; it is of a bright and strong fcarlet colour. The head is small; the legs are moderately long, and form, and are of a paler red than the body. It is common in shallow waters, where it runs very quickly along the bottom. Its diminutive size hinders the beauty of its colours from being perceived, as they are not discernible without the microscope.

11. The holosericeus is a small species: its body is roundish, but a little approaching to oval; the back somewhat depressed; it is of a fine fcarlet colour, and covered with a velvety down. The head is very small; the eyes are two, and very small; the legs are short and of a paler red, and there is a small black spot near the inferior of the anterior ones. It is very common under the surface of the earth, and sometimes on herbs and among hay. It is suppos’d to be poisonous if swallowed; but we do not seem to have any certain account of such an effect.

12. The longipipes is the largest of the acarus kind: its body is roundish, of a dusky brown on the back, with a dusky spot of a rhomboidal figure near the middle of it; the belly is whitish; the legs are extremely long and slender. On the back part of the head there stands a little eminence, which has on it a kind of double crest, formed as it were of a number of minute spines: the eyes are small, and black, and are two in number. It is very common in pastures towards the end of summer. Ray and Lister call it acarus crufatus longipes; Moeufet, aracus longipes; and, notwithstanding its having but two eyes, it has been almost universally ranked among the spiders.

ACASTUS, in classic history, the son of Peleus, king of Thetis, and one of the most famous hunters of his time, married Hippolyta, who falling desperately in love with Peleus her son-in-law, and he refusing to gratify her wishes, she accused him to her husband of rape; on which he slew them both.

ACATALECTIC, a term, in the ancient poetry, for such verses as have all their feet or syllables, in contradistinction to those that have a syllable too few.

ACATAPSY, signifies the impossibility of comprehending something. — The distinguishing tenet of the Pyrrhonists was their affecting an absolute acataply in regard to every thing.

ACATERY, or ACATRY, anctiently an officer of the king’s household, designed for a check between the clerks of the kitchen and the purveyors.
Thus, we

ACATHISTUS, the name of a solemn hymn anciently sung in the Greek church on the Saturday of the fifth week of Lent, in honour of the Virgin, for having thrice delivered Constantinople from the invasions of the barbarous nations.

ACCELERATION, in ancient navigation, a kind of boat or pinnace used for military purposes. The 
aeolum was a species of those vessels called naeum ablatum, i.e. such as were wrought with oars. It was sometimes made use of in battle. Strabo describes it as a privateer or private boat.

ACAIULUS, in botany, a term applied to certain plants, the flowers of which have no pedicel or stalk to support them, but rest immediately on the ground, such as the cardine thistle, &c.

ACCA (St.), bishop of Hagufakitis, or Hexham, in Northumberland, succeeded Wilfrid in that see in 769. He ornamented his cathedral in a most magnificent manner: he furnished it also with plate and holy vestments; and erected a noble library, consisting chiefly of ecclesiastical learning, and a large collection of the lives of the saints, which he was at great pains to procure. He was accounted a very able divine, and was famous for his skill in church-music. He wrote several pieces: particularly, Faedone Sanctorum, the Sufferings of the Saints; Pro illud etanu scripturis, ad Be- dena, for explaining the scripture, addrefTed to Bede. He died in 740, having enjoyed the see of Hexham 31 years, under Egbert king of the Northumbrians.

ACCALIA, in Roman antiquity, solemn festivals held in honour of Acca Laurentia, Romulus's nurse: they were otherwise called Laurentalia.

ACCAPITARE, in law, the act of becoming vassal of a lord, or of yielding him homage and obedience.

Hence, ACCAPITUM, signifies the money paid by a vassal upon his admission to a fev.

ACCUSATION, in ancient law, was used also to express the relief due to the chief lord. See RELIEF.

ACCEDAS AD CURIAM, in the English law, a writ lying, where a man has received, or fears, false judgment in an inferior court. It lies also for justice delayed, and is a species of the writ RECORDARE.

ACCELERATION, in mechanics, the increase of velocity in a moving body. Accelerated motion is that which continually receives fresh accelerations of velocity. Acceleration stands directly opposed to retardation, which denotes a diminution of velocity.

ACCELERATION is chiefly used in physics, in respect of falling bodies, i.e. of heavy bodies tending towards the centre of the earth by the force of gravity. That natural bodies are accelerated in their descent, is evident from various considerations, both a priori and posteriori. Thus, we actually find, that the greater height a body falls from, the greater impellion it makes, and the more vehemently does it strike the subject plane, or other obstacle.

Various were the systems and opinions which philosophers produced to account for this acceleration. But the immediate cause of acceleration is now sufficiently obvious; the principle of gravitation, which determines the body to descend, determining it to be accelerated by a necessary consequence.

Suppose a body let fall from on high: the primary cause of its beginning to descend is doubtless the power of gravity; but when once the descent is commenced, that force becomes in some measure natural to the body; so that if left to itself, it would perforce in it for ever, even though the first cause should cease: as we see in a stone cast with the hand, which continues to move after it is left by the cause that gave it motion. But, beside the propensity to descend impressed by the first cause, and which of itself were sufficient to continue the same degree of motion, once begun, in infinitum; there is a constant accession of subsequent efforts of the same principle, gravity, which continues to act on the body already in motion, in the same manner as if it were at rest. Here, then, being a double cause of motion; and both acting in the same direction, viz. directly towards the centre of the earth; the motion they jointly produce must necessarily be greater than that of any one of them. And the velocity thus increased having the same direction of increase full persisting, the descent must necessarily be continually accelerated.

The motion of a body ascending, or impelled upwards, is diminished or retarded from the same principle of gravity, acting in another direction, in the same manner as a falling body is accelerated: See RETA-

RICATION. A body thus projected upwards, rises till it has lost all its motion: which it does in the same time that a body falling would have acquired a velocity equal to that whither the body was thrown up. Hence the same body thrown up, will rise to the same height from which falling it would have acquired the velocity wherewith it was thrown up: And hence the heights which bodies thrown up with different velocities do ascend to, are one to another as the squares of those velocities.

ACCELERATION of Bodies of Inclined Planes. The same general law obtains here as in bodies falling perpendicularly: the effect of the plane is to make the motion slower; but the inclination being everywhere equal, the retardation arising therefrom will proceed equally in all parts, at the beginning and at the ending of the motion. See MECHANICS.

ACCELERATION of the Motion of Pendulums. The motion of pendulous bodies is accelerated in their descent; but in a less ratio than that of bodies falling perpendicularly. See MECHANICS and PENDULUM.

ACCELERATION of the Motion of Projectiles. See PROJECTILE.

ACCELERATION is also applied in the ancient astronomy, in respect of the fixed stars. This acceleration was the difference between the revolution of the primary mobile and the solar revolution; which was computed at three minutes and 56 seconds.

ACCELERATION of the Moon, a term used to express the increase of the moon's mean motion from the sun, compared with the diurnal motion of the earth: so that it is now a little swifter than it was formerly. Dr Halley was the first who made this discovery; and he was led to it by comparing the ancient eclipses observed at Babylon with those observed by Albatennius in the ninth century, and some of his own time. He was not able to ascertain the quantity of this acceleration, because the longitudes of Bagdad, Alexandria, and Aleppo, where the observations were made, had not been
been accurately determined. But since his time, the
longitude of Alexandria has been ascertained by Chas-
uelles; and Babylon, according to Prolemy’s account,
lies 50° east from Alexandria. From these data, Mr
Dunthorne compared several ancient and modern eclip-
es, with the calculations of them, by his own tabular
and thereby verified Mr. Hale’s opinion; for he found that
the former tables represent the moon’s place more back-
ward than her true place in ancient eclipses, and more
forward than her true place in later eclipses; and thence
justly inferred, that her motion in ancient times was
flower; in later times quicker, than the tables give it.
But he did not content himself with merely, ac-

certaining the fact; he proceeded to determine the quan-
tity of the acceleration; and by means of the most ancient
eclipse of which any authentic account remains, ob-
served at Babylon in the year before Christ 721, he
concluded, that the observed beginning of this eclipse
was not above an hour and three-quarters before the
beginning given by the tables; and therefore the moon’s true
place could precede her place by computation but little
more than 50° of a degree at that time. Admitting
the acceleration to be uniform, and the aggregate of
it as a square of the time, it will be at the rate of
about 10° in 100 years.

Dr. Long attributes the acceleration above described to
one or more of these causes: either. 1. The annual
and diurnal motion of the earth continuing the fame,
the moon is really carried round the earth with a
greater velocity than heretofore; or, 2. The diurnal motion
of the earth, and the periodical revolutions of the moon
continuing the same, the annual motion of the earth
round the sun is a little retarded; which makes the
moon’s apparent motion in the ecliptic a little slower
than formerly, and consequently, the moon in passing
‘from any conjunction with the sun, spends less time
before the again overtakes the sun, and forms a sub-
sequent conjunction: in both these cafes, the motion
of the moon from the sun is really accelerated, and
the synodical moon actually shortened. Or; 3. The annual
motion of the earth, and the periodical revolutions, of the
moon continuing the same, the rotation of the earth round its axis is a little retarded: in this case
days, hours, minutes, seconds, &c., by which all periods
of time must be measured, are of a longer duration;
and consequently the synodical moon will appear to
be shortened, though it really contains the same quan-
tity of absolute time as it always did. If the quantity
of matter in the body of the sun be leffened by the
particles of light continually streaming from it, the
motion of the earth round the sun may become slower:
if the earth increases in bulk, the motion of the moon
round the earth may be quickened thereby. See A-
STRONOMY.

ACCELERATOR, in anatomy, the name of two
muscles of the penis, which serve for ejaculating
or semen. See ANATOMY, Table of the Muscles.

ACCELERENTES, a lower order of minifters in the
Romish church, whose office is to light and trim
the candles.

ACCELERONES, in Roman antiquity, a kind of
gladiators, whose office was to excite and animate the
combatants during the engagement. The orthogra-
phy of the word is controverted: the first edition of Ter-
tullian, by Rhenanus, has it accedones; an ancient
manuscript, accendones. Aquinas adheres to the for-
er, Pighius to the latter. The origin of the word, sup-
tposing it accedones, is from accedo, I kindle; sup-
tposing it accedones, from accedo, I accede, am added to.
The former places their distinguishing character in ex-
livening the combat by their exhorations and go-

tions; the latter supposes them to be much the same
with what among us are called seconds, among the Ita-
lians, patroni: excepting that these latter only fend by
to see the laws of the sword duly observed, without in-
termeddling to give advice or instruction.

ACCENSI, in the Roman armies, certain supernu-
merary folders, destined to supply the places of tho-
of an elocution of the voice. The Latins have made the

fame ufe of these three accents.

The Hebrews have a grammatical, a rhetorical, and

musical accent; through the first and last seem, in effect,
to be the fame; both being comprized under the ge-

geral name of tonic accents, because they give the pro-

per tone to syllables; as the rhetorical accents are said
to be euphonic, because they tend to make the

pronunciation more soft and agreeable. There are

dre euphonic accents, and twenty-five tonic; of which some

are placed above, and others below the syllables; the

Hebrew accents serving not only to regulate the risings

and fallings of the voice, but also to distinguish the

phrases, periods, and numbers of periods, in a discourse;

and to answer the same purposes with the points in

other languages. Their accents are divided into

emperors, kings, dukes, &c., each bearing a title an-

swering to our point. Their king answers to our colon;

and their duke to our comma. The king, however, oc-

casionally becomes a duke, and the duke a king; as the

phrases are more or less short.

It must be noted, by the way, that the manage-

ment and combination of these accents differ in Hebrew

poetry from what they are in prose. The use of the to-

nic or grammatical accents has been much controver-

sied: some holding that they distinguish the sen-

fence; while others maintain that they are only intended to

regulate the music, or singing; alleging that the Jews

sing, rather than read, the scriptures in their

scripts; whereas the Academics, or grammarians, uti-

lize them in their syna-

gogues. Be this, however, as it will, it is certain the

ancient Hebrews were not acquainted with these ac-

cents. The opinion which prevails amongst the learn-

ed, is, that they were invented about the fifth century,

by the Jewish doctors of the school of Tiberias, called

the Mafforetes.

As to the Greek accents, now seen both in manu-

scripts and printed books, there has been no lefs dis-

pute about their antiquity and ufe than about those of

the Hebrews. Isaac Volfius endeavours to prove them

of modern invention; alleging, that anciently they had

nothing of the kind, but only a few notes in their po-

etry, which were invented by Arithophanes the gram-

marian, about the time of Ptolemey Philopater; and

that these were of musical, rather than grammatical ufe,

serving as aids in the singing of their poems, and very
different from those introduced afterwards. He also

flows from several ancient grammarians, that the man-

ner of writing the Greek accents in these days was quite

different from that which appears in our books. The

author of Lall:thode Grecq.ep. 546 observes, that the right

pronunciation of the Greek language being natural to

the Greeks, it was needless for them to mark it by ac-

cents in their writings: so that, according to all ap-

pearance, they only began to make ufe of them after-

as the time in which the Romans, being curious to

learn the Greek tongue, sent their children to study at

Athens, thinking thereby to ftrengthen the pronunciation; and

to facilitate it to foreigners; which happened, as the fame

author observes, a little before Cicero's time. Weinfein,

Greek professor at Basil, in a learned dissertation,

deveaurs to prove the Greek accents of an older stand-

ing. He owns that they were not always formed in the

fame manner by the ancients; but thinks that difference

owing to the different pronunciation which obtained in

the different parts of Greece, he brings several reasons,

a priori, for the ufe of accents, even in the earliest days:

as that they then wrote all in capital letters equidistant

from each other, without any distinction either of words

or phrases, which without accents could scarce be in-
telligible; and that accents were neceffary to diftinguish

ambiguous words, and to point out their proper mean-

ing; which he confirms from a dispute on a pallage in

Homer, mentioned by Aristotle in his l DETT, chap. v.

Accordingly, he observes, that the Syrians, who have

tonic, but no distinctive accents, have yet invented cer-

tain points, placed either below or above the words, to

show their mood, tense, perfon, or fence.

The ufe of accents, to prevent ambiguities, is most

remarkably perceived in some eastern languages, par-

icularly the Siamese and Chinese. Among the peo-

ple of China, every word, or (which is the fame thing)

fyllable, admits of five accents, as spoken more accurately

or remifly; and thus stands for many different things.

The fame found ya, according to the accent affixed

to it, signifies God, a wall, excellent, stupidity, and a

goofy. The Chinese have but 320 spoken words in their

language; but these being multiplied by the different

accents or tones, which affect the vowels, furnish a

language tolerably copious. By means hereof, their

330 simple founds come to denote 1650 things; but

this being hardly fufficient, they are encrafed further

by aspirates added to each word to double the number.

The Chinese only reckon four accents: for which the

milifonaries ufe the following marks, a, a, a, a; to

which they have added a fifth, thus, ا. They made a

kind of modulation; wherein, prolonging the duration

of the found of the vowel, they vary the tone, rafing

and finking it by a certain pitch of voice: so that their

talking is a fort of music or finging. Attempts have

been made to determine the quantity of the rife or fall in

each accent by means of musical notes; but this is

effect, as being different in different persons. Hence

the great difficulty of the language to foreigners; they

are forced to sing most scrupulously: if they deviate

ever fo little from the accent, they fay quite a diffe-

rent thing from what was intended. Thus, meaning

to compliment the perfon you are talking to with the

title Sir, you call him a bead with the fame word,

only a little varied in the tone. Magalhon makes the

language the eafier to learn on this account.— The

Siamese are also obfervcd to sing rather than talk.

Their alphabet begins with fix characters, all only

equivalent to a K, but differently accented. For the

in the pronunciation the accents are naturally on the

vowels, yet they have fome to deftrify fuch of their

confonants as are in other refpects the fame.

Accent, in music, is a certain enforcement of par-

ticular founds, whether by the voice or instruments,

generally ufed at the beginning of bars.

Acceptance, in law, a perfon's agreeing to offers

made in bargaining, by which the bargain is con-

cluded. 

Acceptance, in the church of Rome, is put for

receiving the pope's confitutions.

Acceptance, in commerce, is the fubscribing,

signing, and making one's felf debtor for the sum con-
nained in a bill of exchange or other obligation.

Acceptation, in grammar, the fentence or mean-
ing wherein any word is taken.
ACCESSIBLE, something that may be approached, or that access may be had to. Thus we say, Such a place is accessible on one side, &c.

ACCESSION, in law, is a method of acquiring property, by which, in things that have a close connection or dependence upon one another, the property of the principal thing draws after it the property of the accessory: Thus, the owner of a cow becomes likewise the owner of the calf. It is sometimes likewise signifies content or acquiescence.

ACCESSION, among physicians, is used for a paroxysm of a disease; among politicians, it signifies a prince's succeeding to the government upon the death of his predecessor.

ACCESSORY, or Accessory, something that accedes, or is added to another more considerable thing; in which sense the word stands opposed to principal.

Accessory, or Accessory, in common law, is chiefly used for a person guilty of a felonious offence, not principally, but by participation: as, by assistance, or comfort, or concealment.

There are two kinds of accessories: one, before the fact, and after it.—The first is he who commands, or procures another to commit felony, and is not present himself; for if he be present, he is a principal. The second is he who receives, affilits, or comforts any man that has done murder, or felony, whereof he has knowledge. A man may be also accessory to an accessory, by aiding, receiving, &c. an accessory in felony.

An accessory in felony shall have judgment of life and member, as well as the principal who did the felony; but not till the principal be first attainted, and convicted, or outlawed thereon. Where the principal is pardoned without attainer, the accessory cannot be arraigned; it being a maxim in law, Ubi non est principalis, non potest esse accessorius: but if the principal be pardoned, or have his clergy after attainer, the accessory shall be arraigned; 4 and 5 W. et M. cap. 4. And by lat. 1 Anne, cap. 9. it is enacted, that where the principal is convicted of felony, or flands mute, or challenges above 20 of the jury, it shall be lawful to proceed against the accessory in the same manner as if the principal had been attainted; and notwithstanding such principal shall be admitted to his clergy, pardoned, or delivered before attainer. In some cases only, if the principal cannot be taken, then the accessory may be prosecuted for a misdemeanour, and punished by fine, imprisonment, &c. In the lowest and highest offences there are no accessories, but all are principals: as in riots, roasts, forcible entries, and other trespasses, which are the lowest offences. So also in the highest offence, which is, according to the English law, high treason, there are no accessories.

Accessories, in petty treason, murder, and in felonies of several kinds, are not to have their clergy. There can be no accessory before the fact in manslaughter; because that is sudden and unpremeditated.

ACECITY Nerves, in anatomy, a pair of nerves, which, arising from the medulla in the ventricles of the neck, ascend, and enter the skull, and pass out of it a gain with the par vagum, wrapped up in the same common integument, and after quitting them, are distributed into the muscles of the neck and shoulders. See Anatomy.

ACCESSORY, among painters, an epithet given to such parts of an history-piece as serve chiefly for ornament, and might have been wholly left out: such as vases, armour, &c.

ACCIDENT, a town of Tarraconensis, formerly called Acti; supposed to be Aquadis, to the city of Granada, at the foot of a mountain, near the source of the rivulet Guadalantin; now greatly decayed. It is the Colonia Accitania Genella, and was of some repute among the Roman colonies. The people were called Gemellenses, because the colony consisted of colonists from the third and sixth legions.

ACCI AOLOI (Donata), a man famous for his learning and the honourable employments he professed in Florence his native country, in the 15th century. He wrote, A Latin translation of some of Plutarch's Lives; Commentaries on Aristotle's Ethics and Politics; and the life of Charlemagne. He was sent to France by the Florentines, to sue for succour from Lewis XI. against Pope Sextus IV. but on his journey died at Milan; his body was carried to Florence, and buried in the church of the Carthusians. The small fortune he left his children is a proof of his propriety and disinterestedness. His daughters, like those of Arilides, were married at the public expense, as an acknowledgement of his services. His funeral eulogium was spoken by Christopher Landini; and an elegant epitaph, by Poltions, was inscribed on his tomb.

ACCIDENT, in a general sense, denotes any casual accident.

ACCIDENT, among logicians, is used in a threefold sense. 1. Whatever does not essentially belong to a thing; as the clothes a man wears, or the money in his pocket. 2. Such properties in any subject as are not essential to it; thus whiteness in paper. 3. In opposition to essentiality whatever are called accidents; as sweetness, softness, &c.

ACCIDENT, in grammar, implies a property attached to a word, without entering into its essential definition; for every word, notwithstanding its signification, will be either primitive, derivative, simple, or compound, which are the accidents of words. A word is said to be primitive, when it is taken from no other word in the language in which it is used; thus heaven, king, good, are primitive words. It is said to be derivative, when it is taken from some other word; thus heavens, kingdom, goodness, &c. are derivatives. A simple word is easily distinguished from a compound; thus just, justice, are simple words; unjust, injustice, are compound: res is a simple word, as well as public; but republca is a compound. Besides these accidents, which are common to all sorts of words, each particular species has its accidents; thus the accidents of the noun substantive are the gender, declension, and number; and the adjective has another accident, namely, the comparison. See the article Grammar and Language.

ACCIDENT, in heraldry, an additional point or mark in a coat of arms, which may be either omitted or retained without altering the essence of the armour; such as, abatement, difference, and tincture.
ACCIDENTAL, in a general sense, implies something that happens by accident, or that is not essential to its subject. ACCIDENTA, in philosophy, is applied to that effect which flows from some cause intervening by accident, without being subject, or at least without any appearance of its being subject, to general laws or regular returns. In this sense, accident is opposed to constant and principal. Thus the sun's place is, with respect to the earth, the constant and principal cause of the heat in summer, and the cold in winter; whereas winds, snows, and rains, are the accidental causes which often alter and modify the action of the principal cause.

ACCIDENTAL point, in perspective, is that point in the horizontal line which are the projections of twolines, parallel to each other meet the perspective plane.

ACCIDENTAL Colours, are those which depend upon the affections of the eye, in contradistinction to those which belong to the light itself. The impressions made upon the eye by looking steadfastly at a particular colour, are various, according to the single colour or combination of colours in the object; and they continue for some time after the eye is withdrawn, and give a false colouring to other objects. Mr Buffon has endeavoured to trace the connections which these accidental colours have with such as are natural, in a variety of instances. The subject has also been considered by De la Hire, and M. Epences; and M. d’Arcy has contrived a machine for determining the duration of the effects of light, and after several trials, finds that it continues about eight thirds of a minute.

ACCIPENSER, in ichthyology, a genus of fishes belonging to the Amphibia Nantes of Linnaeus. The accipenser has a single linear nodule: the mouth is in the under part of the head, and contains no teeth; the cirri are below the fin, and in front of the mouth. There are three species of this genus, viz.

1. The ruthenus has 4 cirri, and 15 squamous proterubances. It is a native of Russia.
2. The huo has 4 cirri; the body is naked, i.e. has no prickles or proterubances. The skin of the huo is so tough and strong, that it is employed for ropes in carts and other wheel-carriages; and the ichthyocolla, or binglass of the shops, famous as an agglutinant, and used also for the fining of wines, is made from its scale or scales. The ancients were acquainted with the fish that afforded this drug. The huo is the largest of the genus, and grows to 24 feet in length. It inhabits the Danube and the rivers of Russia.
3. The fluoro, or flurgeon, with 4 cirri and 12 squamous proterubances on the back. This fish annually ascends the rivers in Britain, but in no great numbers, and is taken accident in the salmon-nets. It seems a spiritifed fish, making no manner of resistance when entangled, but is drawn out of the water like a lifeless lump. It is seldom taken far out at sea, but frequents such parts as are not remote from the acutions of great rivers. It is admired for the delicacy and firmness of its flesh, which is white as veal, and extremely good when roasted. It is generally pickled. A considerable quantity are annually sent to Britain from America and the Baltic rivers. Great numbers are taken during summer in the lakes Frisehaff and Cunrich-haff near Pillau, in large nets made of small cord. The adjacent shores are formed into districts, and turned out to companies of fishermen, some of which are reured for six thousand guilders, near three hundred pounds per annum. They are found in vast abundance in the American rivers in May, June, and July; at which time they leap some yards out of the water, and, falling on their sides, make a noise to be heard in full weather at a great distance. Caviare is made of the roe of this fish, and also of all the other sorts of flurgeon, dried, salted, and pickled up clofe. Ichthyocolla, or tiglafra, is likewise made of the found of this fish, as well as that of the others; but in very small quantity. The flurgeon grows to a great size, to the length of 18 feet, and to the weight of 500 pounds. In the manner of breeding, this fish is an exception among the cartilaginous kind; being, like the bony fish, oviparous, spawning in water.

ACCIPITER, the name of Linnaeus's first order of Birds. See ZOOLOGY.

Among the Romans, the term accipiter signified a hawk, and which, from its being very carnivorous, they are considered as birds of bad omen.

Ovid. 

Pliny, however, tells us, that in some cafes, particularly in marriage, it was esteemed a bird of good omen, because it never eats the hearts of other birds; intimating thereby, that no differences in a married state ought to reach the heart. The accipiter was worshipped as a divinity by the inhabitants of Tentyra, an island in the Nile, being considered by them as the image of the sun; and hence we find that luminary represented, in hieroglyphics, under the figure of a hawk.

ACCIUS (Lucius), a Latin tragic poet, the son of a freedman, and, according to St Jerome, born in the consilhip of Hoftillius Mainicus and Atilius Serranus, in the year of Rome 593; but there appears somewhat of confusion and perplexity in this chronology. He made himself known before the death of Pacuvius, a dramatic piece of his being exhibited the same year that Pacuvius brought one upon the stage, the latter being then eighty years of age, and Accius only thirty. We do not know the name of this piece of Accius's, but the titles of several of his tragedies are mentioned by various authors. He wrote on the most celebrated stories which had been represented on the Athenian stage: as Andromache, Andromeda, Ateus, Clytemnestra, Medea, Meleager, Philocletes, the
Acclamations were not unknown on the theatres in the earliest ages of the Roman commonwealth; but they were incident then, and little other than confused shouts. Afterwards they became a sort of regular concerts. That mentioned by Phedrus, letus e mediasmos Roma falso princeps, which was made for Augustus, and proved the occasion of a pleasant mixture of a flute-player called Princps, shows that musical acclamations were in use in that emperor's reign. Recepit enim Provincia nobiliss. caroliss. f. regi. quae fpetulat, says Suetonius, who gives another instance in the time of Tibersius: a false report of Germanicus's recovery being spread through Rome, the whole ran in crowds to the Capitol with torches and victims, singing, Salvya Roma, Salto Patria, Saltem off Germaniis.—Nero, passionately fond of music, took special care to improve and perfect the music of acclamations. Charmed with the harmony wherewith the Alexandrians, who came to the games celebrated at Naples, had sung his praises, he brought several over to infract a number of youth, chosen from among the knights and people, in the different kinds of acclamations practised at Alexandria. They continued in use as long as the reign of Theodoric. But the people did not always make a single chorus; sometimes there were two, who answered each other alternately: thus, when Nero played on the theatre, Buthus and Seneca, who were on either hand, giving the signal by clapping, 5000 soldiers called Auluglatis, began to chant his praise, which the spectators were obliged to repeat. The whole was conducted by a music-master called Mefeborus or Panfarius.—The honour of acclamations was chiefly rendered to emperors, their children, and favourites; and to the magistrates who preferved the peace of the times. Persons of distinguished merit also sometimes received them, of which Quintilian gives us instances in Cato and Virgil. The most usual forms were, Feliciter, Loniorem citam, Aunos felicis. The actors themselves, and they who gained the prizes in the games of the circus, were not excluded from the honour of acclamations.

To theatrical acclamations may be added those of the soldiery and people in time of triumph. The victorious army accompanied their general to the Capitol; and, among the verbs they sung in his praise, frequently, to Triumpha, which the people answered in the same strain. It was also in the way of acclamations, that the soldiers gave their general the title of Imperator, after some notable victory; a title which he only kept till the time of his triumph.

The acclamations of the senate were somewhat more serious than the popular ones; but arose from the same principle, viz. a desire of pleasing the prince or his favourites; and aimed likewise at the same end, either to express the general approbation and zeal of the company, or to congratulate him on his victories, or to make him new protests of fidelity. These acclamations were usually given after a report made by some senator, to which the rest all expressed their consent by crying Omnes, Omnes; or else, Equum est, justum est. Sometimes they began with acclamations, and sometimes ended with them without other debates. It was by this manner that all the elections and proclamations of emperors, made by the senate, were conducted; something of which practice is still retained at modern elections of kings and emperors, where Voto.
Acclamations. Rev. Titre de Roy, and Long live the King, are customary forms.

The Greeks borrowed the custom of receiving their emperors in the public places from the Romans. Lutprand relates, that at a procession where he was present, they sung to the emperor Nicephorus, παραστατης; that is, Many years: which Codin explains thus, by τον ἔλεγον τοις παραστατης, or by τος παραστατης; and the wish or salutation by παραστατης. And at dinner, the Greeks then present wished with a loud voice to the emperor and Bradas, Ut Deus anus multiplicant; as he translates the Greek. Plutarch mentions an acclamation so loud, upon occasion of Flamininus's restoring liberty to Greece, that the very birds fell from heaven with the shout. The Turks practise something like this on the right of their emperors and grand viziers to this day.

For the acclamations wherewith authors, poets, &c. were received, who recited their works in public; it is to be observed, the assemblies for this purpose were held with great parade in the most solemn places, as the capital, temples, the Athenaeum, and the houses of great men. Invitations were sent every where, in order to get the greater appearance. The chief care was, that the acclamations might be given with all the order and pomp possible. Men of fortune who pretended to wit, kept able applauders in their service, and lent them to their friends. Others endeavoured to gain them by presents and treaties. Philostratus mentions a young man named Vavus, who lent money to the men of letters, and forgave the interest to such as applauded his exercises. These acclamations were conducted much after the same manner as those on the theatre, both as to the music and the accompaniments; they were to be suited both to the subject and to the person. There were particular ones for the philosophers, for orators, for historians, and for poets. It would be difficult to rehearse all the forms of them; one of the most usual was Sophies, which was to be repeated three times. Martial comprehends several other usual forms in this verse:

Accolation. Cита, Negquiter, Exus, Beate.

Neither the Greeks nor Romans were barren on this head. The names of gods and heroes were given thence whom they would extol. It was not enough to do it after each head of discourse, chiefly after the exordium; but the acclamations were renewed at every fine passage, frequently at every period.

The acclamations wherewith the speclators honoured the victories of the athletes, were a natural consequence of the impetuous motions which attended the gymnastic games. The cries and acclamations of the people, sometimes expressing their compassion and joy, sometimes their horror and disgust, are strongly painted by different poets and orators.

Acclamations made also a part of the ceremony of marriage. They were used for the man's sake; being the Latia Ovina, sometimes spoken of before marriage in Roman writers.

Acclamations, at first practised in the theatre, and palling thence to the senate, &c. was in process of time received into the acts of councils, and the ordinary assemblies of the church. The people expressed their approbation of the preacher variously; the more usual were, Griissant Thard Apothe, &c. There acclamations being sometimes carried to excess, and often miscalculated, were frequently prohibited by the ancient doctors, and at length abrogated; though they appear to have been in some use as low as the time of St. Bernard.

Acclamation M. thus, among antiquaries, such as represent the people expressing their joy in the posture of acclamation.

Accuracy, the rise or ascent of a hill, in opposition to the declivity or descent of it. Some writers in fortification use it for the talus of a rampart.

Accola, among the Romans, signified a person who lived near some place; in which sense it differed from incolla, the inhabitant of such a place.

Accolade, a ceremony anciently used in the conferring of knighthood.

Antiquaries are not agreed wherein the accolade properly consisted. The generality suppose it to be the embrace, or kiss, which princes anciently gave the new knight, as a token of their affection: whence the word accolade; q. d. a clasping, or taking round the neck. Others will rather have it to be a blow on the chine of the neck, given on the same occasion. The Accolade is of some antiquity, in which fewer of the two fenes it be taken. Greg. de Tours writes, that the kings of France, even of the first race, in conferring the girt shoulder-belt, kissed the knights on the left cheek. For the accolade, or blow, John of Salisbury affures us, it was in use among the ancient Normans: by this it was that William the Conqueror conferred the honour of knighthood on his son Henry. At first, it was given with the naked fist; but it was afterwards changed into a blow with the flat of the sword on the shoulder of the knight.

Accolée, sometimes synonymous with Accolade, which is also it is used in various senses in heraldry: sometimes it is applied to two things joined; at other times, to animals with crowns, or collars about their necks, as the lion in the Ogilvy's arms; and, lastly, to kews, battons, maces, swords, &c. placed fullerwise behind the shield.

Accolti (Bernardo), secretary to the republic of Florence, was furnished L'Unico, or the Nonfuch, probably from the great extent of his understanding, the variety of sciences he had acquired, and the excellency of his poetic vein; which not only gained him a feast among the academicians of the court of Urbino, but made that great Mecenas, pope Leo X. in 1520, create him prince of the state of Nepi. He wrote many pieces; among others, a collection of beautiful poems, printed in Venice in 1590 and 1553.

accommodation, the application of one thing, by analogy, to another; or the making two or more things agree with one another.

To know a thing by accommodation, is to know it by the idea of a similar thing referred thereto.

A prophecy of scripture is said to be fulfilled various ways: properly, as when a thing foretold comes to pass: and improperly, or by way of accommodation, when an event happens to any place or people, like to what fell out some time before to another. Thus, the words of Isaiah, spoken to thine of his own time; are said to be fulfilled in those who lived in our Saviour's; and are accommodated to them: "Ye hypocrites, well did Isaiah prophecy of you," &c. which same words St Paul afterwards accommodates to the Jews of his time.

The
The primitive church accommodated multitudes of Jewish, and even heathen ceremonies and practices, to Christian purposes; but the Jews had before done the same by the Gentiles; some will even have circumcision, the tabernacle, brazen serpent, &c. to have been originally of Egyptian use, and only accommodated by Moses to the purposes of Judaism. Spencer maintains, that most of the rites of the old law were an imitation of those of the Gentiles, and particularly of the Egyptians; that God, in order to divert the children of Israel from the worship they paid to the false deities, consecrated the greatest part of the ceremonies performed by those idolaters, and had formed out of them a body of the ceremonial law; that he had indeed made some alterations therein, as barriers against idolatry; and that he thus accommodated his worship to the genius and occasions of his ancient people. To this De lege, condensation of God, according to Spencer, is owing.

ACCOMPANIMENT, something attending or added as a circumstance to another, either by way of ornament, or for the sake of symmetry.

ACCOMPANY, in music, denotes the instruments which accompany a voice, in order to suit it, as well as to make the music more full. The accompaniment is used in recitative, as well as in song; on the stage, as well as in the choir, &c. The ancients had likewise their accompaniments on the theatre; they had even different kinds of instruments to accompany the chorus, from those which accompanied the actors in the recitation. The accompaniment, among the moderns, is frequently a different part or melody from the song it accompanies. It is disputed whether it was so among the ancients. It is generally alleged, that their accompaniments went no farther than the playing in octave, or in antiphony to the voice. The Abbé Frugier, from a passage in Plato, pretends to prove, that they had actual symphony, or music in parts: but his arguments seem far from being conclusive.

ACCOMPANY, in painting, denotes such objects as are added, either by way of ornament, or probability; as dogs, guns, game, &c. in a hunting piece.

ACCOMPANY, in heraldry, any thing added to a shield by way of ornament; as the belt, mantling, supporters, &c. It is also applied to several bearings about a principal one; as a saltier, bend, fess, chevron, &c.

ACCOMPLICE, one that has a hand in a business; or is privy in the same design or crime with another. See ACCESSORY.

By the law of Scotland, the accomplice can only be prosecuted after the conviction of the principal offender, unless the accession of the accomplice is immediate, in esp. airt, so as in effect to render them co-principal. By the general rule, the accomplice suffers the same punishment with the principal offender; yet if he he remarkably less guilty, justice will not permit equal punishment.

The council of Sens, and several other synodical statutes, expressly prohibit the revealing of accomplices. ACCOMPLISHMENT, the entire execution or fulfilling of any thing.

ACCOMPLISHMENT, is principally used in speaking of events foretold by the Jewish prophets in the Old Testament, and fulfilled under the New. We say a literal accomplishment, a mystical or spiritual accomplishment, a single accomplishment, a double accomplishment, a Jewish accomplishment, a Christian accomplishment. The same prophecy is sometimes accomplished in all, or in several of those different ways. Thus, of some of the prophecies of the Old Testament, the Jews find a literal accomplishment in their own history, about the time when the prophecy was given: the Christians find another in Christ, or the earliest times; the heathens another, in some of their emperors; the Mahometans another, in their legislator, &c. There are two principal ways of accomplishing a prophecy; directly, and by accommodation. See ACCOMMODATION, and PROPHECY.

ACCOMPLISHMENT, is also used for any mental or personal endowment.

ACCORD, in painting, is the harmony that reigns among the lights and shades of a picture.

ACCORDS (Stephen Tabourou, seigneur des) advocate in the parliment of Dijon in France, and king's advocate in the bailiwick and chancery of that city, born in the year 1549. He was a man of genius and learning; but too much addicted to trifles, as appears from his piece, intituled, "Les Bigarrures," printed at Paris in 1582. his was not his first production, for he had before printed some sonnets. His work, intituled, "Les Touches," was published at Paris in 1585; which is indeed a collection of witty poems, but worked up rather in too loose a manner, according to the licentious taste of that age. His Bigarrures are written in the same strain. He was cenured for this way of writing, which obliged him to publish an apology. The lordship of Accords is an imaginary fief or title from the device of his ancestors, which was a drum, with the motto, à tous accords, "chiming with all." He had sent a sonnet to a daughter of Mr Be - gat, the great and learned president of Burgundy, who (says he) did me the honour to love me; and inasmuch (continues he), I had inscribed my sonnet with only my device, à tous accords, this lady first nicknamed me, in her answer, Seigneur des Ac cord; by which title her father also called me several times. For this reason I chose this surname, not only in all my writings composed at that time, but even in these books." He died July 24th 1561, in the 40th year of his age.

ACCOUNT, or ACCOMPT, in a general sense, a computation or reckoning of any thing by numbers. Collectively, it is used to express the books which merchants, traders, bankers, &c. use for recording their transactions in business. See BOOK-KEEPING.

Chamber of Accounts, in the French polity, is a sovereign court of great antiquity, which takes cognizance of and registers the accounts of the king's revenue. It is nearly the same with the English Court of Exchequer.

ACCOUNT is taken sometimes, in a particular sense, for the computation of time: thus we say, The Julian Account, the Gregorian Account &c. in which sense it is equivalent to styie.

ACCOUNTANT, or ACCOUMTANT, in the most general sense, is a person skilled in accounts. In a more restricted sense, it is applied to a person, or officer, appointed to keep the accounts of a public company or office; as the South-sea.
ACCOUNTANTSHIP, the art of keeping and balancing accounts. See Book-keeping.

ACCOUNTANT-GENERAL, a new officer in the court of Chancery in Great Britain appointed by act of parliament to receive all moneys lodged in court instead of the masters, and convey the same to the bank of England for security.

ACCOUNTREMENT, an old term, applied to the furniture of a soldier, knight, or gentleman.

ACCRETION, in physics, the increase, or growth of an organical body, by the accession of new parts. See Nutrition, Plants, and Vegetables.

Accretion, among civilians, the property acquired in a vague or unoccupied thing, by its adhering to or adhering by right of accretion. The word comes from the Latin *accretio*, denoting a thing's being added to another already occupied; thus, if a legacy in a vague or unoccupied thing, by its adhering to or adhering to the survivor.

The Romans, during the frugal ages of the republic, were strangers to it: for as to this, it was reputed an indecency in them to place more than one person on each bed; to crowd more, was deemed for this reason.

The Romans, during the frugal ages of the republic, were strangers to this. Before they came to table, the pony stood at the head of the bed, with his feet extended behind the back of the second; the second lay with the back of his head towards the navel of the first, only separated by a pillow, his feet behind the back of the third; and so of the third, or fourth. The middle place was esteemed the most honourable. Before they came to table, they changed their clothes, putting on what they called *sanauria vestis*, the dining-garment; and pulled off their flows, to prevent fouling the couch.

ACCUBITOR, an ancient officer of the emperors of Constatinople, whose business was to lie near the emperor. He was the head of the youth of the bed-chamber, and had the *cubicularesium* and procurator under him.

ACCU MULATION, in a general sense, the act of heaping or piling things together. Among lawyers, it is used in speaking of the concurrence of several titles to the same thing, or of several circumstances to the accumulation of proof.

Accumulation of Degrees, in an university, is the taking several of them together, or at smaller intervals than usual, or than is allowed by the rules of the university.

ACCRUSED, something that lies under a curse, or sentence of excommunication. In the Jewish idiom, *accursed* and *crucified* were synonymous. Among them, every one was accounted *accursed* who died on a tree. This serves to explain the difficult passage in Rom. ix. 3, where the apostle Paul wishes himself *accursed* after the manner of Christ, i.e. crucified, if happily he might by such a death save his countrymen. The proposition is here made use of, is used in the same sense, 2 Tim. 1. 3, where it obviously signifies after the manner of.

ACCRUSIUS, a law-professor in the 13th century, born in Florence. His authority was for some time so great, that he was called the idol of the Lawyers. —Other three lawyers of note had the same name.

Accursius (Mariangelus), a famous critic of the 12th century, born at Aquilon in the kingdom of Naples. His Diatribe, printed at Rome in folio in 1524, on Ovid and Solinus, are a proof of his abilities in this kind of erudition. In his edition of Ammianus Marcellinus there are five books more than in any of the preceding ones; and he affirms he had corrected 5000 errors in that historian. His predominant passion was the searching for and collecting of old manuscripts: yet he made Latin and Italian verses, was complete master of the French, German, and Spanish tongues; and understood optics and music. He purged himself by oath, being charged for being a plagiarist with regard to his Antonius; it being reported, that he had appropriated to himself the labours of Pa- bricio Varana, bishop of Camerino.

ACCUSATION, the charging any person with a criminal action, either in one's own name, or in that of the public. The word is compounded of *ad*, to; and *causeri*, to plead.

Writers on politics treat on the benefit and the inconveniences of public accusations. Various arguments are alleged, both for the encouragement and discouragement of accusations against great men. Nothing, according to Michelet, tends more to the preservation of a state, than frequent accusations of persons trusted with the administration of public affairs. This, accordingly, was strictly observed by the Romans, in the instances of Camillus, accused of corruption by Manlius Capitolinus, &c. Accusations, however, in the judgment of the same author, are not more beneficial than calumnies are pernicious; which is also confirmed by the practice of the Romans. Manlius not being able to make good his charge against Camillus, was cast into prison.

By the Roman law, there was no public accuser for public crimes; every private person, whether interested in the crime or not, might accuse, and prosecute the accused to punishment, or abolishment. Cato, the most innocent person of his age, had been accused 42 times, and as often abolished. But the accusation of private crimes was never received but from the mouths of those who were immediately interested in them; None (e.g.) but the husband could accuse his wife of adultery.

The
The ancient Roman lawyers distinguished between posdatio, delatia, and accusatio. For, acrim, leave was granted to bring a charge against one, which was called posdatio; when he against whom the charge was laid, was brought before the judge: which was called derever, or nonnus delatia: lastly, the charge was drawn up and presented, which was properly the accusatio. The accusation properly commenced, according to Padianus, when the reus or party charged, being interrogated, denied he was guilty of the crime, and subscribed his name to the delatia made by his opponent.

In the French law, none but the Procureur general, or his deputies, can form an accusation, except for high-treason and coinage, where accusation is open to every body. In other crimes, private persons can only act the part of denounced, and demand reparation for the offence, with damages.

In Britain, by Magna Charta, no man shall be imprisoned or condemned on any accusation without trial by his peers, or the law: none shall be vexed with any accusation, but according to the law of the land; and no man may be molested by petition to the king, &c., unless it be by indictment or presentment of lawful men, or by process at common law. Promoters of suggestions, are to find surety to purge them; and if they do not make them good, shall pay damages to the party accused, and also a fine to the king. No person is to be made a party, unless it be by petition to the king, &c.

There are several kinds of birth, from Schenckius, for the offence, with damages. The accused, and also a fine to the king. No person is not make them good, unless it be by petition to the king, &c., unless it be by indictment or presentment of lawful men, or by process at common law. Promoters of suggestions, are to find surety to purge them; and if they do not make them good, shall pay damages to the party accused, and also a fine to the king. No person is to be made a party, unless it be by petition to the king, &c.

The ancient voyagers, viewing certain barbarous people from the coasts, had been impressed by their uncouth dress; for that the Samogitians, being florn of stature, and going in the vicinity of winter with their heads covered in hoods, seem at a distance as if they were headless. P. Laftat says, that by Acephaloi are only meant, people whose heads are sunk below their shoulders. In effect, Hulius, in his epitome of Sir Walter Raleigh's voyage to Guiana, also speaks of a people which that traveller found in the province of Irivipana, between the lakes of Panama and Callipus, who had no head or neck; and Hondius, in his map, marks the place with the figures of three monsters. Yet De Lacta rejects the story; being informed by others, that the inhabitants of the banks Amer.l.7 of the Caora, a river that flows out of the lake of c. 22. Callipus, have their head so far sunk between their shoulders, that many believed they had their eyes in their shoulders and their mouths in their breasts.

But though the existence of a nation of Acephaloi be ill warranted, naturalists furnish several instances of individuals born without heads, by some lufus or aberration of nature. Wepfer gives a catalogue of such accephalous births, from Schenckius, Licetus, Pariss, Wollfs, Mauriceau, &c.

Acephaloi, an obsolete term for the taenia or tape. 

Acephali, a term applied to several sects who refused to follow some noted leader. Thus the perons who refused to follow either John of Antioch, or St Cyril, in a dispute that happened in the council of Ephesus, were termed Acephaloi, without a head or leader. Such bishops, also, were as exempt from the jurisdiction and discipline of their patriarchs, were styled Acephali.

Acephali, the levellers in the reign of Henry I. who acknowledged no head or superior. They were reckoned so poor, that they had not a tenement by which they might acknowledge a superior lord.

Acephalous, or Acephaloi, in a general sense; without a head.

The term is more particularly used in speaking of certain nations, or people, represented by ancient naturalists and cosmographers, as well as by some modern travellers, as formed without heads; their eyes, mouths, &c., being placed in other parts.

Such are the Blemmyes, a nation of Africa near the head of the Niger, represented to be by Pliny and Solinus; Blemmyes traduntur capita abebe, ore et oculis bellentis. Ctesias and Solinus mention others in India near the Ganges, fine cervix, caules in humoris habentem. Mela also speaks of people, quius capitis et velutis in pettere, quarto. And Suidas, Stephanus Byzantius, Vopiscus, and others after them, related the like. Some modern travellers still pretend to find accephalous people in America.

Several opinions have been framed as to the origin of the fable of the Acephali. The first is that of Thomas Bartholin, who turns the whole into a metaphor; being convinced, that the name Acephali was anciently given to such as had loss brain, or conducted themselves as by the rules of prudence, than others. Olearius rather apprehends, that the ancient voyagers, viewing certain barbarous people from the coasts, had been impressed by their uncouth dress; for that the Samogitians, being short of stature, and going in the vicinity of winter with their heads covered in hoods, seem at a distance as if they were headless. P. Laftat says, that by Acephali are only meant, people whose heads are sunk below their shoulders.

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A C E [ 60 ] A C E

Acer, or the Maple-tree, is a genus of the monoeoic order, belonging to the polymagia class of plants; and ranking under the 23d Natural Order Trihitita. — The generic characters, both natural and essential, are: The Hermaprodite calyx is an acute, coloured, one-leaved perianthium, divided into five segments, flat and entire at the base, and persistent: the corolla is five-petal'd, ovate, and expanding; the flamina consist of eight subulate short filaments; the anther is simple, the dust cruriform: The pistillum has a compriised germen, imbeded in the receptacle, which is convex, perforated, and large; the stylos is filiform: the stigma are two, pointed, slender, and reflex: The perianthium consists of two or three capsulars, united at the base, roundish, compriised, each terminated with a large membranous wing: The seeds are solitary and roundish. The Male caty's, corolla, and flamina, are the same as in the hermaphrodite; the pistillum has no germen, nor stylos; the stigma is beaded. [Nota. On the first opening of the flower, the stigma alone appears; a few days after, the stylos. — The hermaphrodite flowers on the same umbel are frequently of two sorts: the inferior ones feminine, the antheres of which do not burst, but the pistillum quickly grows into fruit: the superior ones masculine, of which the antheres scatter their pollen, but the pistillum without increasing fall off.]

Species, with their uses and properties. — 1. The pendif-platanus, or sycamore, is a very large and beautiful tree, with broad leaves, divided into five lobes serrated in their edges; of a dark green colour on the upper side, but paler and somewhat hoary underneath; the flowers are very small, and of a greenish white colour. The corolla of this species is frequently distinguisihable from the other, and the stamina are long. The fruit is large, and beautifully variegated with green and purple. This species is a native of Germany, but thrives very well in Great Britain, where it is frequent in plantations. It is very proper for making plantations near the sea, or sheltering such as are already too near it; because the sycamore-tree refists the spray of the ocean much better than most other trees. But it has this inconvenience, that its leaves are devoured by insects, so as to become full of holes, and very unightly: which has caused the planting of it to be much neglected of late. It has, however, long been considered as a timber tree, having been much used by the turners for wooden bowels, dilies, trenchers, &c.; but since the custom of using earthen ware has become so prevalent, its value for those purposes has greatly decreased. There are two varieties; one with broad leaves and large keys, the other with variegated leaves. By tapping it yields a liquor not unlike that of the birch tree; from which the highlanders of Scotland some times make an agreeable and wholesome wine.

2. The campestris, or common maple, is too well known to need any particular description, as it grows very frequently in hedge-rows in most parts of Britain. The timber of the common maple is far superior to the beech for all the uses of the turner. When it abounds with knots, as it frequently does, it is highly esteemed by joiners for inlaying. It is also frequently employed for making musical instruments, on account of its lightness; and for the whiteness of its wood was formerly esteemed for making tables, &c. But the principal value of the maple is for underwood; it being of a quick growth, and affording good fuel.

3. The negundo, or Virginian ash-leaved maple, is a very strong hoothing tree; and in Virginia, where it is a native, is one of the largest trees of this kind. Its leaves are of a pale green, and well adapted to give a variety of tint: but Hanbury says, that this tree ought not to be planted in exposed situations, the branches being subject to be split off by the wind. Its uses are similar to those of the sycamore.

4. The Platanoids, or Norway-maple, grows naturally in Norway, Sweden, and other northern countries of Europe. It rises to a good height, and is well furnished with branches with smooth leaves, of a shining green colour, and beautifully indented. These have an acid milky juice, which prevents them from being preyed upon by insects as the sycamore is; and as this species refists the spray of the sea equally with the fir, it is preferable in plantations situated near the sea. In summer the leaves dye to a golden yellow colour, which caueth a delightful effect at that season when the different tints of decaying vegetables are displayed. The flowers are also beautiful; they come out early in the spring, are of a fine yellow colour, and show themselves to advantage before the leaves come out. They are frequently succeeded by keys, which sometimes arrive at maturity in Britain. There is a variety with striped leaves.

5. The rubrum, or Virginia scarlet flowering maple, is a native of that country, and never grows to a large size in Britain. It is, however, cultivated in gardens for the beauty of its flowers, which appear in the beginning of April, in roundish bunches, at the bottom of the footstalks of the leaves. The flowers are ripe in five or six weeks after; and ought to be immediately fown, being otherwise very apt to wither. The tree ought to be sheltered, especially whilst young, from the north-east winds; it delights in a moist light soil, where it will thrive much better, as well as produce many more flowers and much better seeds, than in a dry ground. A variety of this tree is known in England by the name of Sir Charles Wager's flowering maple, from its being first sent from America to Sir Charles Wager. The flowers of this kind come out in larger clusters than the other, and surround the small branches, so that the tree appears entirely covered with them, and makes a much more beautiful appearance than the former, which is now not so much esteemed.

6. The saccharinum, or sugar-maple, is a large growing tree; will arrive at the height of 40 feet; and has broad thin leaves, divided into five principal parts; which are again indented or cut at the edges into several acute segments. Their surface is smooth, of a light green colour, whitish underneath; and they grow on pretty long footstalks. The flowers come out in the spring, about the time of the Norway maple; and they are succeeded by long keys, which sometimes ripen in England. In America the inhabitants tap this tree in the spring, boil the liquor, and the feces afford.
ford a useful sugar. The sycomore, the ash-leaved, and the Norway maples, also abound with a saccharinaceous juice, from which there is no doubt but a useful sugar might be prepared.

7. The Penylvanum, or American mountain-maple, resembles the fugar-maple, only its leaves are more pointed.

8. The ocalis, or Italian maple, is very common in most parts of Italy, particularly about Rome; but in Britain is very rarely to be met with, though hardly enough to bear the open air. It is one of the largest species of trees in Italy, and affords a great shade by its numerous and large leaves. On this account it is planted on the road-sides, and near habitations.

9. The monspelulanum, or Montpellier maple, is common in the south of France, and in Italy; but is hardly met with in Britain. The leaves resemble those of the common maple; but are of a much thicker substance, a shining green colour, and not so large. They continue in verdure very late in the autumn, which renders the trees more valuable.

10. The creticum, or Cretan maple, grows naturally in the Levant; it somewhat resembles the last species; but its leaves are of a much thicker texture, and their footstalks covered with a soft hairy down; whereas those of the other are smooth and soft.

Propagation and culture.—1. By seeds. The first two species are easily propagated in this way. The seeds, when ripe in autumn, may be gathered, and in a few days after sown about an inch and an half deep, in beds of common mould. In spring the plants will appear, and make a shoot of about a foot and an half by the autumn following, if the ground of the seminary be tolerably good, and they are kept free from weeds. The spring after they come up they should be planted in the nursery in rows two feet and an half auster, and their distance in the rows must be one foot and an half. Here they may remain till they are big enough to plant out finally, with no further trouble than taking off unliplantly side-branches, and fuch as have a tendency to make the tree forked, except digging between the rows, which must always be done every winter. For the other species, their seeds, as they do not ripen in this country, ought to be procured from the places where they naturally grow, and managed in the following manner: A cool shady part of the seminary should be appropriated for the purpose; the mould should be made fine; beds should be marked out four feet wide, and in length proportionable to the quantity; and in these the seeds should be regularly sown, sifting over them about half an inch of the finest mould. When the plants come up, they must be kept clean from weeds, and frequently watered; and this work must be duly attended to all summer. The next spring, the strongest may be drawn out, and planted in the nursery, in rows two feet auster, and at the distance of a foot from each other in the rows; leaving the others in the seminary to gain strength. The spring following they also must receive the same culture; and in the nursery they may remain with no other trouble than keeping the ground clean from the weeds in summer, digging between the rows in the winter, and taking off all strong and irregular side-shoots till they are planted out. Trees raised from seeds will grow faster, and arrive at greater height, than those raised from layers; but they will not pro-

produce such quantities of flowers; which makes the latter method more eligible for those who want these plants for a low shrubbery. — Seeds of the variegated kinds also, when sown, will produce variegated plants in rows, which renders the propagation of these sorts very expeditious, where either the space or the ground will admit. Where these are not to be obtained, the plants are propagated by budding, as afterwards directed.

2. By layers. All the species may be propagated by this method; though it is never practised for the common maple and the sycomore. The young shoots may be at any time laid down in the autumn, winter, or early in the spring. By the autumn following, they will have struck root, and become good plants; when the strongest may be set out in the places where they are to remain; whilst the weakest may be planted in the nursery, like the seedlings, for a year or two, to acquire strength.

3. By cuttings: which method, however, is chiefly practised on the ash-leaved and Norway maples, which more readily take root this way. The cuttings should be the bottom parts of the last year's shoots: They should be taken off early in October, and planted in rows in a moist shady place. The spring and summer following, they must be duly watered as often as dry weather makes it necessary, and be kept clean from weeds. By the autumn they will be fit to remove into the nursery; though if the cuttings are not planted too close, they may remain in their situation for a year or two longer, and then be set out finally, without the trouble of being previously planted in the nursery.

4. By budding, grafting, and inarching. These methods are only practised for the variegated sorts and the large broad-leaved kind. The latter is to be continued no otherwise than by budding it on italks of the common sycomore; for from the seeds, tho' so large themselves, only the common sycomore is produced.

In order to propagate these varieties by budding, let some plants of the common sycomore, one year old, be taken out of the seminary, and set in the nursery in rows a yard auster, and the plants about a foot and a half distance from each other. Let the ground be kept clean from weeds all summer, and turned in the winter; and the summer following the fodds will be of a proper size to receive the buds, which should be taken from the most beautifully-stripped branches. The best time for this work is the middle or latter end of August. Having then budded your sodds with the eyes or buds fronting the north, early in October take off the half-matting, which before this time will have confined the bark and pinched the bud, but not so as to hurt it much. Then cut off the fodd just above the bud, and dig the ground between the rows. The summer following, keep the ground clean from weeds; cut off all natural side-hours from the fodd as they come out; and by autumn, if the land is good, the buds will have shot forth, and formed themselves into trees five or six feet high. They may be then removed into the places where they are destined to remain; or a few of them only may be drawn out, leaving the others to be trained up for larger standards. The striped Norway maple should be budded on fods of its own kind; for on these they take best, and both kinds are not very liable to run away from their colours. Variegated plants in general must be planted in
poor, hungry, gravelly, or sandy soils, to feed the dif-
cafe which occasions these beautiful strips, and cause it to be more powerful. But these trees show their strips in greater perfection in a good soil: The plant, though in sicknels, has the appearance of health; the shoots are vigorous and strong; the leaves are large, left liable to be hurt by insects; and the strips appear more perfect, natural, and beautiful, than those on flunted trees growing on a poor soil.

ACERB, a four rough astringency of taste, such as that of unripe fruit.

ACERNO, a town of Italy, in the exterior principality of Naples, with a bishop's see. E. Long. 15. 40. N. Lat. 40. 50.

ACERINA, in ichthyology, a name given by Pliny, and other of the old naturalists, to the fish we at this time call the ruffe. See PERCA.

ACERRA, in antiquity, an altar erected, among the Romans, near the bed of a person deceased, on which his friends daily offered incense till his burial.—The real intention probably was to overcome any offensive smell that might arise from the corpse. The Chinese have fill a coffin like this: they erect an altar to the deceased in a room hung with mourning; and place an image of the dead person on the altar, to which every one that approaches it bows four times, and offers oblations and perfumes.

The Acerra also signified a little pot wherein were put the incense and perfumes to be burnt on the altars of the gods and before the dead. It appears to have been the same with what was otherwise called thuris-bulums, and pyxis.

We find mention of Acerra in the ancient church. The Jews had also their Areat, in our version rendered cespers; and the Romanists still retain them under the name of inscepo-pots. In Roman writers, we frequently meet with plena acerra, a full acerra: to understand which, it is to be observed, that people were obliged to offer incense in proportion to their estate and condition; the rich in larger quantities, the poor only a few grains; the former poured out acerras full on the altar, the latter took two or three bits with their fingers.

ACERRA, a town of Italy, in the kingdom of Naples, and in the Terra di Lavoro; seat on the river Agno. E. Long. 15. 10. N. Lat. 40. 55.

ACERRE (anc. geog.), the ancient name of a town on the Clarius, in Campania, not far from Naples, now Acerra.—The name also of another town, now called la Circe in the territory and to the south-east of Lod, where the rivulet Serio falls into the Adda, to the west of Cremona and north of Placentia.

ACESCENT, a word used to denote any thing which is turning four, or which is slightly acid. It is only applied properly to the former of these two meanings. The second may be exprest by either of the two words, acetabulum or sub-acid.

ACETABULUM, in antiquity, a measure used by the ancients, equal to one-eighth of our pint. It seems to have acquired its name from a vessel in which acetum or vinegar was brought to their tables, and which probably contained about this quantity.

ACETABULUM, in anatomy, a cavity in any bone for receiving, the protuberant head of another, and there-

by forming that species of articulation called ENAR-
THROSIS.

ACETABULUM, in botany, the trivial name of a species of the peziza, or cup-peziza, a genus belonging to the cryptogam fungi of Linnaeus. It has got the name of acetabulum, from the resemblance its leaves bear to a cup. See PEZIZA.

ACETUM, VINEGAR, the vegetable acid of the chemists. See VINEGAR.

ACETUM, VINEGAR, the vegetable acid of the chemists. See VINEGAR.

ACHABYTUS (anc. geog.), a high mountain in Rhodes, on the top of which stood a temple of Jupiter.

ACHAIA (anc. geog.), a town of the island of Rhodes, in the district of Japyx, and the first and most ancient of all, fald to be built by the Heliaides, or Grandfons of the Sun.

ACHAEA, a hamlet of Atalid Sarmatia on the Euxine. The inhabitants were called Achai, a colony of the Orchomenians.

ACHAEANS, the inhabitants of ACHIIA Propria, a Peloponnesian state. This republic was not considerable in early times, for the number of its troops, nor for its wealth, nor for the extent of its territories; but it was famed for its probity, its justice, and its love of liberty. Its high reputation for these virtues was very ancient. The Crotonians and Sybarites, to re-establish order in their towns, adopted the laws and customs of the Achaenians. After the famous battle of Leucera, a difference arose betwixt the Lacedemonians and Thebans, who held the virtue of this people in such veneration, that they terminated the dispute by their decision. The government of the Achaenians was democratic. They preferred their liberty till the time of Philip and Alexander: But in the reign of those princes, and afterwards, they were either subject to the Macedonians, who had made themselves masters of Greece, or opprefled by cruel tyrants. The Achaean commonwealth conftituted of twelve inconfiderable towns in Peloponnesus. Its firft annals are not marked by any great action, for they are not graced with one eminent character. After the death of Alexander, this little republic was a prey to all the evils which flow from political discord. A zeal for the good of the community was now extingufhed: Each town was only attentive to its private interest. There was no longer any flability in the state; for it changed its masters with every revolution in Macedonia. Towards the 124th Olympiad, about the time when Ptolemy Soter died, and when Pyrrhus invaded Italy, the republic of the Achaenians recovered its old institutions and unanimity. The inhabitants of Patae and Dymet were the first afferers of ancient liberty. The tyrants were banifhed, and the towns again made one commonwealth. A public council was then held, in which affairs of importance were difcufled and determined. A regifter was
ACHAJE [63]

ACHAJAE, a name taken for that part of Greece which Ptolemy calls Hellas; the younger Pliny, Graecia; now called Livadia; bounded on the north by Thessaly, the river Sperchius, the Sinus Malicus, and mount Oeta; on the west by the river Achelous; on the east, running a little to the north, it is washed by the Archipelago, down to the promontory of Samium; the south, joined to the Peloponnesus, or Morea, by the isthmus of Corinth, five miles broad. Achaia Propria, anciently a small district in the north of Peloponnesus, running westward along the bay of Corinth, and bounded on the west by the Ionian Sea, on the south by Elis and Arcadia, and on the east by Sicyonia: inhabitants, the Achaeni, properly so called; its metropolis, Patra. It is now called Romania Alia, in the Morea. Achaia was also taken for all those countries that joined in the Achaean league, reduced by the Romans to a province. Likewise for Peloponnesus. Achaia Presbyteri, or the Presbyters of Achaia, were those who were present at the martyrdom of St. Andrew the Apostle, A.D. 59; and are said to have written an epistle in relation to it. Bellarmine, and several other eminent writers in the church of Rome, allow it to be genuine, while Du Pin, and some others, expressly reject it. ACHADIUS, son of Echinos, was raised to the crown of Scotland, A.D. 788. The emperor Charlemagne sent an embassy to desire an alliance with him against the English, whose parties so infested the seas, that the merchants could not carry on their trade. This alliance was concluded in France upon conditions so advantageous to the Scots, that Achadius, to perpetuate the memory of it, added to the arms of Scotland a double field fowled with lilies. He died in 810. ACHALALACTLI, in ornithology, a species of king-t-ffiler. See ALCEDO. ACHANE, the son of Carmi, of the tribe of Judah, at the taking of Jericho concealed two hundred shekels of silver, a Babylonish garment, and a wedge of gold, contrary to the express command of God. This sin proved fatal to the Israelites, who were repulsed at the siege of Ai. In this dreadful exigence, Joshua prostrated himself before the Lord, and begged that he would have mercy upon his people. Achian was discovered by calling lots, and he and his children were stoned to death. This expiation being made, Ai was taken by stratagem. John vii. 8, 9. ACHANE, an ancient Persian corn measure, containing 45 Attic medimnii. ACHARACA, anciently a town of Lydia, situate between Trullas and Nysa; in which were the temple of Pluto, and the cave Charonius, where patients slept in order to obtain a cure. ACHAT, in law, implies a purchase or bargain. And hence probably purveyors were called Achators, from their making bargains. ACHATES, the companion of Eneas, and his most faithful friend, celebrated in Virgil... ACHATES, in natural history. See AEGATE. ACHATES (anc. geog.), a river of Sicily, now the Drillo; which runs from north to south, almost parallel with, and at no great distance from, the Gelai, and rives in the north of the territory of Notto. It gave name to the Achates, or Agate, said to be first found there. ACHAZIB, or ACHII, (anc. geog.), a town of Galilee, in the tribe of Abin, nine miles from Potalmas.—Alfo a town in the more southern parts of the tribe of Judah. ACHEN, ACHEN, or ACHEN, a kingdom of Samaria in the East-Indies, situated on the north-western part of the island. The capital is situated on a river which empties itself near the north-west point, or Achen-head, about two miles from the mouth. It lies in a wide valley, formed...
A C H

Acheen, formed like an amphitheatre by two lofty ranges of hills. The river is not large, and by emptying itself fill several Acheens.

The general of Malay bazars, excepting that the superior goods of their country, and receive in return, gold-dust, japa-wood, betel-nut, patch-leaf \( \text{calophyllum} \), a little pepper, sulphur, camphire, and benzoin. The country is supplied with Bengal opium, and also with iron, and many other articles of merchandise, by the European traders.

Acheen is esteemed, comparatively, healthy, being more free from woods and swamps than most other portions of the island; and the fevers and dysenteries to which these are exposed to give occasion, are there said to be uncommon. The soil is light and fertile; and the products, besides those already enumerated as articles of export trade, and a variety of fine fruits, are chiefly rice and cotton. There is likewise some raw silk procured in the country, of very inferior quality. Gold dust is collected in the mountains near Acheen, but the greatest part is brought from the southern ports of Malabar and Sooloo. The sulphur is gathered from a volcano mountain in the neighbourhood, which supplies their own consumption for the manufacture of gun-powder, and admits of a large exportation.

In their persons, the Acheene different from the rest of the Sumatrans, being taller, flunter, and darker complexioned. They appear not to be a genuine people, but are thought, with great appearance of reason, to be a mixture of Batta, Malays, and Moors from the west of India. In their dispositions they are more active and industrious than their neighbours; they possess more penetration and capacity; have more general knowledge; and as merchants, they deal upon a more extensive and liberal footing. Their religion is Mahometanism; and, having a great number of mosques and priests, its forms and ceremonies are strictly observed.

The appearance of the town, and the nature of the buildings, are much the same as are found in the generality of Malay bazars, excepting that the superior wealth of this place has occasioned a great number of public edifices, but without the smallest pretensions to magnificence. The king's palace, if it deserves the appellation, is a vast and uncouth piece of architecture, designed to resist the force of an enemy, and surrounded for that purpose by strong walls, but without any regular plan, or view to the modern system of military attack. The houses in common are built of bamboo and rough timber, and raised some feet from the ground on account of the place being overflowed in the rainy season.

A considerable fabric of a thick species of cotton cloth, and of stuff for the short drawers worn both by Malays and Acheene, is established here, and supplies an extensive demand. They weave also very handsome silk pieces, of a particular form, for that part of the dress which is called by the Malays an \( \text{eysen} \) \( \text{farrang} \).

The Acheene are expert and bold navigators, and employ a variety of vessels, according to the voyages they undertake, and the purposes for which they design them. The river is covered with a multitude of fishing sampans or canoes, which go to sea with the morning breeze, and return in the afternoon, with the sea wind, full laden.

Having no convenient coins, though most species of money will be taken there at a valuation, they commonly make their payments in gold dust, and for that purpose are all provided with scales or small steel yards. They carry their gold about them wrapped up in pieces of bladder, and often purchase to so small an amount, as to make use of grain or seeds for weights.

The monarchy is hereditary; and the king usually maintains a guard of 100 Seapoys about his palace.

According to Mr Marshden, "the grand council of the nation consists of, the King or Sultan, four \( \text{osloballangs} \), and eight of a lower degree, who sit on his right hand, and sixteen \( \text{cajoorangs} \), who sit on his left. At the king's feet sits a woman, to whom he makes known his pleasure; by her it is communicated to an eunuch, who sits next to her, and by him to an officer named \( \text{cajoorang kondong} \), who then proclaims it aloud to the assembly. There are also present two other officers, one of whom has the government of the \( \text{bazar or market} \), and the other the superintending and carrying into execution the punishment of criminals. All matters relative to commerce and the customs of the port come under the jurisdiction of the \( \text{shahander} \), who performs the ceremony of giving the \( \text{chap or licence for trade} \); which is done by lifting a golden handed cresset over the head of the merchant who arrives, and without which he dares not to land his goods. Prefents, the value of which are become very regularly ascertained, are then sent to the king and his officers. If the stranger be in the style of an ambassador, the royal elephants are sent down to carry him and his letters to the monarch's presence; these being first delivered into the hands of an eunuch, who places them in a silver dish, covered with rich silk, on the back of the largest elephant, which is provided with a machine \( \text{hounder} \) for that purpose. Within about an hundred yards of an open hall where the king sits, the cavalcade stops, and the ambassador dismounts, and makes his obeisance by bending his body, and lifting his joined hands to his head. When he enters the palace, if an European, he is obliged to take off his shoes; and having made a second obeisance, is seated upon a carpet on the floor, where \( \text{bostel} \) is brought to him. The throne was some years ago of ivory and tortoiseshell, and when the place was governed by queens, a curtain of gauze was hung behind it, which did not obstruct the audience, but prevented any perfect view. The stranger, after some general discourse, is then conducted to a separate building where he is entertained with the delicacies of the country, by the officers of state, and in the evening returns in the manner he came, surrounded by a prodigious number of lights. On high days \( \text{arcs rhab} \) the king goes in great state mounted on an elephant richly caparisoned, to the great mosque, preceded by his \( \text{osloballangs} \); who are armed nearly in the European manner.

The country under the immediate jurisdiction of Acheen, is divided into three districts, named \( \text{Duo peclos} \).
ACHEOLOUS, in fabulous history, wrestled with Hercules, for no less a prize than Deianira, daughter to king Oeneus: but as Acheclus had the power of assuming all shapes, the contest was long doubtful: at last, as he took that of a bull, Hercules tore off one of his horns; so that he was forced to stoop, and to redeem it by giving the conqueror the horn of Amalthea, the same as our quarter, or eight bushels. The name Acheloë, a river of Acarnania; which rises in the mountains, and falls from north to south into the sea near the promontory of Chimerium, to the west of the Sinus Ambraeisus, in a course from north to south. Acheron, a river of Epirus. The poets feigned it to have been the son of Ceres, whom the hero in hell for fear of the Titans, and turned into a river, over which fown departed were ferried in their way to Elyium. Acheron, a river of the Bruttii in Italy, running from east to west: Where Alexander king of Epirus was slain by the Lynci, being deceived by the oracle of Dodona, which bid him beware of Acheron. Acherus, an ancient measure of corn, conjectured to be the same as our quarter, or eight bushels. Acherusia Pelus, a lake between Cumæ and the promontory Misenum, now il Lago Della Collucia, (Cluerius.) Some confound it with the Laci Lucrinus, and others with the Lacus Avernus. But Strabo and Pliny distinguish them. The former takes it to be an effusion, an exudation, or washes of the sea, and therefore called by Lycothron, Acherusa spad. Also a lake of Epirus, through which the Acheron runs. There is also an Acherusa, a peninsula of Bithynia on the Exuniae, near Heraclea; and a cave there of the same name, through which Hercules is said to have descended to hell to drag forth Cerberus. Achiar, is a Malay word, which signifies all sorts of fruits and roots pickled with vinegar and spice. The Dutch import from Batavia all sorts of achiar, but particularly that of Bamboo (see Arundo), a kind of cane, extremely thick, which grows in the East Indies. It is preferred there, whilst it is still green, with a very strong vinegar and spice; and is called bakoos-achiar. The name changes according to the fruit with which the achiar is made. Achicolum, is used to express the fornicis, tholos.
ACHILLÆA, YARROW, MILFOIL, NOSEBLEED, or SNEEZEWORT; a genus of the order of the polygamous superfamily, belonging to the syngepenia class of plants. The natural order to which it belongs is the 49th, Composite dicoidae.

The characters are: The common calyx is ovate and imbricated; the hermaphrodite corollas are tubular in the discus, the feminine linear and from 5 to 10 in the rays. The proper corolla of the hermaphrodites is funnel-shaped, expanded, and divided into 5 segments; that of the females, tongue-shaped, inversely corollated, expanding, and of 3 segments. The flamine in the hermaphrodites consists of 5 very short capillary filaments; the anthers is cylindrical and tubular. The Achillea in the hermaphrodites has a small germen; the stamen is filiform in the length of the flamine; the stigma is obtuse and emarginated; in the females, the germen is small; the stamen is filiform; the stigmata are 3, obtuse and reflexed. The pericarpium is wanting; the calyx scarcely changed; the receptacle filiform, elongated at the disc of the seeds, ovate, and twice as long as the calyx. The seeds are solitary, ovate, and furnished with a lock of wool; no pappus. The receptacle is chaffy and elevated.

Species and properties. There are 20 species, of which the following are the principal: 1. The milfoil, or common yarrow, is found naturally on banks, and by the sides of foot-paths, in most parts of England. It most commonly bears white flowers, though a variety of it is found which bears purple ones. Thefe, however, do not long continue to bear flowers of this colour, if transplanted into gardens. It was formerly used in medicine; but though it may still have a place in some dispensatories, no physician of any note expects any virtue from it, or even prescribes it. It creeps greatly by its roots, and also multiplies by the seeds, so that it becomes a troublesome weed where it is once allowed to get a footing. The cultivation of it is recommended by Mr Anderson, in his Essays on Agriculture, as a proper food for cattle. This species was the proper achillea of the ancients, so named from Achilles; who, having been the disciple of Chiron, first brought it into use for the cure of wounds and ulcers.

2. The fantolina, or eastern sneezewort, is sometimes cultivated in gardens; it has large yellow flowers, which hand upon pretty long footstalks placed singly, not in bunches as in the common kind. It has leaves like lavender-cotton, which, when rubbed, emit a strong oily odour. The flowers appear in June and July.

3. The tomentosa, or woolly yarrow, is a native of the south of France and Spain, but lives in the open air in England. The flowers are of a bright yellow, and continue long in beauty, growing in clusters at the top of the footstalks, which seldom rise above a foot high. The leaves are finely cut, and very hoary.

4. The abrotanifolia, or tall eastern yarrow, is a native of the islands in the Archipelago; it grows to the height of two feet and a half, with large umbels of yellow flowers on the top; the leaves resemble those of the common wormwood, and are cut into long narrow segments.

5. The clava, or Alpine umbelliferous wormwood, takes its name from the mountains of which it is a native. It seldom grows above 3 or 4 feet in height; it supports umbels of white flowers, like those of the common sneezewort, which appear in April and May. The leaves are hoary, and shaped like those of wormwood, which often decay in the autumn and winter.

6. The tanacetifolia, or eastern sneezewort, with tansey leaves, is a very handsome plant, seldom rising above 5 to 6 feet in height. The flowers are nearly as large as those of the common sneezewort, white, and growing in flat umbels. They appear in June and July.

7. The ageratum, or sweet achillea, is a native of the Alps. It is a plant that is often used in medicine; it is said to have a very pleasant smell; it was formerly much used in medicine and for culinary purposes, but has now fallen so much into neglect as to be totally unknown in the markets; so that when it is demanded, the white maudlin is substituted in its stead. The reason of this substitution was, that the latter is more hardy and easily propagated than the sweet maudlin, which is apt to rot in wet winters. The common maudlin flowers in June and July, and the seeds are ripe in September.

8. The Egyptiaca, or hoary sneezewort, is a native of the Archipelago. It hath very hoary leaves, which remain all the year; and the plants growing close together, make a beautiful appearance at all seasons. The flowers are yellow, and are produced in umbels on the top of the stalks; they appear in June, and continue till the end of September.

9. The ptarmica, or common sneezewort, is a native of the Alps. It is a plant that is often used in medicine; it is said to have a very pleasant smell; it was formerly much used in medicine and for culinary purposes, but has now fallen so much into neglect as to be totally unknown in the markets; so that when it is demanded, the white maudlin is substituted in its stead. The reason of this substitution was, that the latter is more hardy and easily propagated than the sweet maudlin, which is apt to rot in wet winters. The common maudlin flowers in June and July, and the seeds are ripe in September.

10. The macrophylla, or Alpine sneezewort, with fewer leaves, is a native of the Alps. It produces many stalks rising near three feet high; having loose branching umbels of white flowers on their top, resembling those of the common sneezewort, but larger.

11. The nana, or hoary Alpine milfoil, is likewise a native of the Alps; the leaves are hoary, and the umbels of its flowers are more compact than the former; the stalks do not rise more than a foot high.

12. The nobilis, or sweet milfoil, approaches to the nature of the common milfoil; but its leaves are of a paler green, and are neither so long nor so much cut off as those of the common milfoil: they have a strong sweet scent when bruised.

13. The alpina, or white maudlin, bears some resemblance to the common sneezewort; but the leaves are longer, of a deeper green colour, and deeply indented in their edges; the flowers are white, and the roots creep far under ground. The plant will rise, in good land, to the height of four feet.

Culture. All the sorts of yarrow are easily propagated by seeds, which may be sown either in the spring or
ACHILLINI (Alexander), born at Bologna, and doctor of philosophy in that university. He flourished in the 15th and 16th centuries, and by way of eminence was styled the Great Philosopher. He was a flated follower and accurate interpreter of Averroes upon Aristotle, but most admired for his acuteness and strength of arguing in public and private disputations. He made a surprising quick progress in his studies, and was very early promoted to a professorship in the university; in which he acquitted himself so much that his name became famous throughout all Italy. He continued at Bologna till the year 1506; when the university of Padua made choice of him to succeed Antonio Francatiano in the first chair of philosophy, and his fame brought vast numbers of students to his lectures at Padua: but the war, wherein the republic of Venice was engaged against the league of Cambrai, putting a stop to the lectures of that university, he withdrew to his native country; where he was received with the same marks of honour and distinction as before, and again appointed professor of philosophy in Bologna. He spent the remainder of his life in this city, where he died, and was interred with great pomp in the church of St. Martin the Great, which belongs to the Carmelite Friars. Jovius, who knew Achillini, and heard his lectures, says, that he was a man of such exceeding simplicity, and so unacquainted with address and flattery, that he was a laughing-stock to the pert and fancy young scholars, although esteemed on account of his learning. He wrote several pieces on philosophical subjects, which he published, and dedicated to John Bentivoglio.

Achillini (Clodius), grandson of the former, read lectures at Bologna, Ferrara, and Parma; where he was reputed a great philosopher, a learned divine, an excellent lawyer, an eloquent orator, a good mathematician, and an elegant poet. He accompanied Cardinal Ludovico, who went as legate into Piedmont, but being afterward neglected by this cardinal, when he became pope under the name of Gregory XV. he left Rome in distress, and retired to Parma; where the duke appointed him professor of law, with a good salary. He published a volume of Latin Letters, and another of Italian poems, which gained him great reputation: he died in 1640, aged 66.

Achiotte, or Achiot, a foreign drug, used in dying, and in the preparation of chocolate. It is the same with the substance more usually known by the name anonto; which see.

Achiropoetos, a name given by ancient writers to certain miraculous pictures of Christ and the Virgin, supposed to have been made without hands. The most celebrated of these is a picture of Christ, preferred in the church of St. John Lateran at Rome; said to have been begun by St. Luke; but finished by the ministry of angels.

Achmet, son of Seirim, has left a book concerning the interpretation of dreams according to the doctrine of the Indians, Persians, and Egyptians, which was translated out of the Greek into Latin by Leo Tuscus in 1160. He lived in the 9th century.

Achmet-Gedec, a famous general under Mahomet II. and Bajazet II. in the 15th century. When Mahomet II. died, Bajazet and Zezan both claimed the throne: Achmet sided with the former, and by his brave...
bravery and conduct fixed the crown on his head. But
Bajazet took away his life; shining virtue being always
an unpardonable crime in the eyes of a tyrant.

ACHMETSCHET, a town of the peninsula of
the Crimea, the residence of the sultan Galga, who is
called son of the Khan of Tartary. Long. 51. 20. Lat.
45° 40′.

ACHMIM, a large town of Upper Egypt, situated
on the eastern bank of the Nile. "One admires there
(says Abulfeda, as quoted by Mr Savary), a temple,
which is comparable to the most celebrated monuments
of antiquity. It is constructed with stones of a surpris-
ing size, on which are sculptured innumerable figures."  
Though this town be fallen from its ancient splendor,
it is still one of the most beautiful of Upper Egypt.
According to Mr Savary, an Arab prince commands
there, and the police is well attended to. The streets
are wide and clean, and commerce and agriculture
flourish. It has a manufactory of cotton, stuffs, and pot-
ttery, which are conveyed over all Egypt. It is the
same that Herodotus calls Chasmos, and Strabo
Pasopolis, or the city of Pan, who was worshipped there.
Herodotus says, that Perseus was a native of this city,
and that his descendants had established festivals there
in his honour. It has lost its ancient edifices, and much
of its extent; the ruins of the temple, defcribed by
Abulfeda, being without its limits, to the north. No-
thing remains of it but some stones, of such magnitude
that the Turks have not been able to move them.
They are covered with hieroglyphics. On one of them are
traced four concentric circles, in a square. The inner-
most of these contains a fun. The two succeeding ones,
divided into 12 parts, contain, one, 12 birds, the other,
12 animals almost effaced, which appear to be the
signs of the zodiac. The fourth has no divisions, and
presents 12 human figures, which Mr Savary imagines
to represent the 12 gods, the 12 months of the year,
and the 12 signs of the zodiac. The Egyptians, says
Herodotus, are the first who divided the year into 12
months, and employed the names of the 12 gods. The
four seasons occupy the angles of the square, on the
side of which may be distinguished a globe with wings.
Mr Savary thinks it probable that this stone belonged
to a temple dedicated to the sun, that the whole of
these hieroglyphics mark his passage into the signs of
the zodiac, and his course, whose revolution forms the
year. The columns of this temple have been partly
broken to make lime and millstones. Some of them
have been transported into one of the mosques of
Achmim, where they are placed without taste; others are
heaped up in the squares of the town.

Mr Savary tells us of a serpent which is wor-
shipped here, and is the wonder of the country.
"Upwards of a century ago (says he), a religious
Turk called Scheilk Habidi died here. He pased
for a saint among the Mahometans; who raised a
monument to him, covered with a cupola, at the
foot of the mountain. The people flocked from all
parts to offer up their prayers to him. One of their
priests, profiting by their credulity, persuaded them
that God had made the foul of Scheilk Habidi pass in
the body of a serpent. Many of these are found in
the Thebais, which are harmless; and he had
taught one to obey his voice. He appeared with his
serpent, dazzled the vulgar by his surprizing tricks,
and pretended to cure all disorders. Some lucky in-
stances of success, due to nature alone, and sometimes
to the imagination of the patients, gave him great ce-
lebrity. He soon confined his serpent Habidi to the
tomb, producing him only to oblige princes and per-
fons capable of giving him a handsom recompense.
The successor of this priest, brought up in the fame
principles, found no difficulty in giving fuch a
fame, and concluded to inatent an advantageous an error. They added to the general
persuasion of his virtue that of his immortality. They
had the boldnes even to make a public proof of it.
The serpent was cut in pieces in presence of the Emir,
and placed for two hours under a vase. At the infant
of lifting up the vase, the priests, no doubt, had the
address to substitute one exactly resembling it. A mir-
cle was proclaimed, and the immortal Habidi acquired a
fneen degree of confideration. This knavery procures
them great advantages. The people flock from all quar-
ters to pray at this tomb; and if the serpent crawls
out from under the stone, and approaches the fuppliant,
it is a sign that his malady will be cured. It may be
imagined, that he does not appear till an offering has
been made proportioned to the quality, and riches of
the different persons. In extraordinary cafes, where
the fick person cannot be cured without the presence
of the serpent, a pure virgin must come to solicit him.
To avoid inconveniences on this head, they take care
to shew a very young girl indeed. She is decked out
in her best clothes, and crowned with flowers. She
puts herfeif in a praying attitude; and as the priests
are inclined, the serpent comes out, makes circles
round the young fuppliant, and goes and repofes on
her. The virgin, accompanied by a vaft multitude,
carries him in triumph amidst the general acclama-
tion. No human reafoning would perfuade these igno-
rant and credulous Egyptians that they are the dupes
of a few impostors: they believe in the serpent Ha-
ridi as firmly as in the prophet."

ACHONRY, a small town of Ireland, in the
province of Connaught and county of Sligo, feated on
the river Shannon.

ACHOR, a valley of Jericho, lying along the river
Jordan, not far from Gilgal, so called from Achan,
the troubler of Israel, being there ftoned to death.

Achor, in medicine, a species of Herpes.

Achor, in mythology, the god of flies; to whom,
according to Pliny, the inhabitants of Cyrene sacrificed,
in order to obtain deliverance from the insects and the
disorders occasioned by them.

ACHRASINA (anc. geog.), one of the four
cities or divisions of Syrakus, and the strongest, largest,
and most beautiful part of it; separated by a very strong
wall from the outer town, Typha and Neapolis. It was
adorned with a very large forum, with beautiful por-
ticos, a moft elegant pyraneum, a fparious famine-
house, and a fuperb temple of Jupiter Olympus.

ACHRAS, or SAPOTA PLUM: a genus of the mo-
negynia order, belonging to the hesandria clafs of
plants; and ranking in the 43d Natural Order, Du-
nojia.

The characters are: The calyx is a perianthium,
consisting of six ovate concave eréct leaflets, the ex-
terior ones broader and shorter, the interior ones co-
oured. The corolla is composed of one ovate petal,
the height of the calyx; the border divided into six
segments,
ACH [69] ACI

ACANTHERA, in botany, the trivial name of a species of Rhexia.

ACICULAR, the small pikes or prickles of the hedge-hog, echinus-marinus, &c.

ACIDALUS (Valens) would, in all probability, have been one of the greatest critics in these latter ages, had he lived longer to perfect those talents which nature had given him. He was born at Witstock, in Brandenburg; and having visited several academies in Germany, Italy, and other countries, where he was greatly esteemed, he afterwards took up his residence at Bredlaw, the metropolis of Sicilea. Here he remained a considerable time; in expectation of some employment; but nothing offering, he turned Roman-Catholic, and was chosen rector of a school at Niefla. It is related, that about four months after, as he was following a procession of the hoft, he was feized with a sudden phrenzy, and being carried home, expired in a very short time. But Thuanus tells us, that his excessive application to study was the occasion of his untimely death: and that his sitting up a-nights in composing his conjectures on Plautus, brought upon him a distemper which carried him off in three days, on the 25th of May 1593, being just turned of 28. He wrote a Commentary on Quintus Curtius; also, Notes on Tacitus, on the twelve Panegyrics; besides speeches, letters, and poems. His poetical pieces are inferred in the Delicia of the German poets; and consist of epistles, odes, and epigrams. A little piece, printed in 1595, under the title of Maters non esse hominis, "That women were not of the human species," was falsely ascribed to him. But the fact was, that Acidalus, happening to meet with the manuscript, and thinking it very whimsical, transcribed it, and gave it to the bookfeller, who printed it. The performance was highly exclaim'd against, insomuch that the bookfeller being feized, he discovered the person who gave him the manuscript, and a terrible outcry was made against Acidalus. A story goes, that being one day to dine at a friend's house, there happened to be several ladies at tale; who, supposing him to be the author, were moved with so much indignation, that they threatened to throw their plates at his head. Acidalus, however, ingeniously diverted their wrath. In his opinion, he said, the author was a judicious person, the ladies being certainly more of the species of angels than of men. Mr. Bailllet has given him a place among his Enfans Celebrés; and says, that he wrote a comment upon Plautus when he was but 17 or 18 years old, and that he composed several Latin poems at the same age.

ACIDALUS, a fountain in Orchomenus, a city of Boeotia, in which the Graces, who are sacred to Venus, bathed. Hence the epithet Acidalius, given to Venus, (Virgil.)

ACIDITY, that quality which renders bodies acid.
ACIDOTON, in botany, the trivial name of a species of ADELIA.

ACIDS, in chemistry, the name by which one of the general classes of fluids are distinguished. The characteristic marks of them are, 1. The peculiar taste which we call sour; though this does not hold universally: for the acid of arsenic, which in other respects manifests a strong acid power, has not this sour taste; nor are the volatile sulphurous acid, or those of tungslen and molybdæna, lately discovered by Mr Scheele, very distinguishable in this way. On the other hand, the strong acids of vitriol, nitre, and even sea-salt, are altogether caustic, and cannot be tasted until they have been largely diluted with water. 2. With water they combine into a fluid, the specific gravity of which is not a medium between the water and acid separately taken. This holds good with the strong acids, which grow hot with water, and shrink into less bulk by reason of their emitting a quantity of the fire they contain: but whether it also takes place in the weaker acids, has not yet been ascertained; though the probability is, that it will take place in them also. 3. With spirit of wine, they unite into a very volatile and inflammable substance called ether. This must also be understood of the strong mineral acids, or of the acetic when very much concentrated; for the acetic of tartar, borax, arsenic, lapis ponderosus (tungslen), and molybdæna, do not produce any. 4. They change the blue colour of vegetables to red, and heighten the colour of those which are already red. This property is more universal than those we have yet mentioned; though the probability is, that it will take place in them also. 5. They unite with all kinds of earths excepting the siliceous (though the fluoric acid dissolves this also), with fixed and volatile alkalies, and with metals, in such a manner as to form compounds considerably permanent, and whose ingredients cannot be separated without some difficulty. This is the most universal and distinguishing mark; and there is not any acid but what phlegmatized with water, and shrinks. 6. With sugar it forms the acid of sugar.

The opinion of Mr Lavoyer concerning the composition of acids has in part been adopted by Mr Kirwan; who, in his treatise on Phlogiston, published in 1757, informs us that he is now of opinion "that dephlogificated air becomes an essential constituent part of acids. All acids (he adds) consist of two principles: one peculiar to each, which, in the opinion of the antiphlogists, has not as yet been decomposed, and consequently must be looked upon, relative to the present state of our knowledge, as a simple substance: the other, pure air, in a concrete state; that is, deprived of the greater part of its specific heat, and condensed into a small volume. The first they call the acid basis; the last, the oxygenous principle: thus the vitriolic acid, according to them, consists of sulphur as its basis, and pure air in a concrete state as its acidifying or oxygenous principle. This doctrine of the composition of acids has been admitted by some of the ablest defenders of phlogiston, and particularly by that distinguished philospher M. de Morveau, with this single modification, that the bases of acids contain phlogiston, which they lose on uniting to pure air: yet it seems very difficult to conceive how pure air can unite to phlogiston, a substance to which it has the greatest affinity, without forming a new compound endowed with very different properties from those which it possessed before such union. It seems therefore more reasonable to conclude, either that it forms water, as Mr Cavendish thinks; or fixed air, as I shall afterwards endeavour to prove."
Kirwan first states the opinion of the antiphlogiarians, viz. That the vitriolic acid, when considered abstractedly from the water it contains, always consists of sulphur (which they consider as a simple substance) united to a large portion of the oxygenous principle. "In my opinion (says he), it consists of a basis or radical principle, which, when saturated with phlogiston, constitutes sulphur; when saturated with fixed air, becomes common fixed vitriolic acid, and, when combined partly with the one and partly with the other, becomes volatile vitriolic acid. That sulphur, during its conversion into vitriolic acid, unites to air of some sort or other, is evident from the quantity of air which it absorbs, in whatever way that conversion is brought about. Thus, first, during combustion in respirable air, 100 grains of sulphur absorb 246 cubic inches of pure air, or about 2.43 grains; but the proportion of this pure air united with a given quantity of sulphur is not easily determined, because it is vitriolic air that is conflagrably formed; and this air essentially contains fixed air of sulphur in solution, to which portion is variable. Secondly, Pyrites, during their decomposition, absorb a considerable proportion of pure air, as Mr Lavoisier has observed; for also does liver of sulphur exposed to the atmosphere, for after some time it is converted into tatar vitriolate."

Mr Kirwan next proceeds to inquire, whether the air absorbed during the combustion of sulphur continues to be pure air; or whether it be converted into water or fixed air? He inclines to the latter opinions, for various reasons, which he specifies.

With regard to the nitrous acid, the experiments of Mr Cavendish, as well as of the French chemists, leave no room to doubt that it is produced during the distillation of dephlogisticated and inflammable air. Mr Cavendish has shown that the nitrous acid may be formed by taking the electric spark in a mixture of three measures of phlogisticated air and seven of dephlogisticated air, or, in weight, one part of the former and about 2/6 of the latter. Mr Lavoisier, as has been already mentioned, supposes the nitrous acid to be composed of nitrous air united to the oxygenous principle, or basis of pure air; and 100 grains of dry nitrous acid consist of 64 grains of nitrous air united to 36 of pure air deprived of its specific fire; or, according to Mr Kirwan's calculation, 173 cubic inches of nitrous air and 105 of pure air. But nitrous air, as Mr Lavoisier himself has observed, is a compound; 100 grains of it, according to him, containing 32 of phlogisticated and 68 of pure air; consequently 64 grains of it contain 20.5 of phlogisticated air, and 43.5 of pure air. Hence, according to him, 100 grains of dry nitrous acid contain 79 of pure air and 20 of phlogisticated air. Mr Kirwan is of opinion that 100 grains of pure, dry, and colourless nitrous acid contain 38.17 grains of fixed air as its acidifying principle, 57.06 of nitrous basis, and 4.77 of phlogiston united to the nitrous basis. With regard to the nitrous basis itself, he says that one third of its weight is phlogisticated and two thirds dephlogisticated air, both in a concrete state.

"Nitrous basis (says Mr Kirwan), saturated with phlogiston, constitutes nitrous air; 100 grains of this basis take up nearly 22 of phlogiston. Hence the constant principles of nitrous acid are fixed air, dephlogisticated air, phlogisticated air, and inflammable air, all in their concrete state.

"Red, yellow, green, and blue nitrous acids, when those colours are intense, owe their origin to the absorption of nitrous air; and consequently the proportion of their principles is variable, though all have the dephlogisticated acid for their ground. Thus Dr Pritchley, having exposed strong pale-yellow nitrous acid to the sun, has shewn that the gravity of the solution could not be less than 1,400 to nitrous air, found that 100 grains of this acid absorbed, in two days, 247 cubic inches of nitrous air: now, 100 grains of this spirit must have contained, by my calculation, about 21 grains of dry acid, and these 21 grains took up 91.29 grains of nitrous air. When about 20 cubic inches of nitrous air were absorbed (that is, about seven grains), the acid became of an orange colour; and when 30 cubic inches were absorbed (about 9 grains) it became green; and when nearly the whole was absorbed, it evaporated in the form of nitrous vapour, carrying off part of the water with it. Hence we see, that nitrous vapour consists of nitric acid united to three or four times its weight of nitrous air and a little water."

Mr Kirwan next proceeds to contest Mr Lavoisier's opinion, that nitric acid is a constituent principle of the nitrous acid. "The following experiments (says he) show that nitrous acid is not a constituent principle of the nitrous acid, but that fixed air is. 1. There is not a doubt but that pure nitrous acid enters entire, and without decomposition, into fixed alkalis, and forms nitrite. Now if nitre be distilled in a good earthen retort, it will be wholly decomposed; and so also will the acid itself, except a few drops which pass in the beginning of the distillation, and nothing but dephlogisticated air, more or less pure, and consequently intermixed with phlogisticated air and a slight proportion of fixed air, will be found in these, therefore, are its true constituent parts when digested from substances that cannot communicate phlogiston to it in any remarkable quantity, such as alkalies and earths, but if it be separated from substances that contain phlogiston, such as metals, it will then indeed be resolved into nitrous air and dephlogisticated air more or less pure, the phlogiston of the fixed air being detained by the metal. Mr Berthollet, who seems to have made the experiment with the greatest exactness, produced 714 cubic inches of dephlogisticated air from a troy ounce of nitre. This, however, was far from being of the purest kind; and Dr Pritchley, Mr Berthollet, and Mr Suckow, observ'd, that the air which first passes contains fixed air and renders lime-water turbid. Here then we have three of the constituent parts of the nitrous acid, with scarce any nitrous acid; which the antiphlogiarians suppose to be one of the constituent parts of the acid, and to make two thirds of its bulk when exhibited in an aerial form.

To obviate an objection that the quantity of fixed air thus obtained is too small to deserve to be ranked among the constituent parts of the nitrous acid, Mr Kirwan first inquires in what proportion it ought to exist there; and though this is variable, according to the different states of the nitrous acid with respect to phlogistication, he reckons it at one-third of the acid as existing in the nitre; and, from the decomposition of this..."
Acids. 

This fixed air, and the phlogiston emitted by it of consequence, he attributes the phlogification and reduction of the nitrous acid when exposed to more heat. As a proof that fixed air may be decomposed in this manner, he adds two experiments of Dr Priestley. In one of these, dephlogisticated air was obtained by means of acetic acid in that concentrated state in which it is called radical vinegar. Having mixed half an ounce of the acid with two ounces of calcined whiting, he obtained from it 350 ounce-measures of air; of which about one third was fixed more in the first portion, and left in the last. The standard of the residuum in the first portion was 1.66, in the second, 1.42, and in the third, 1.28; which is very near the goodness of common air. The whiting then weighed 760 grains. On adding a quarter of an ounce more of radical vinegar, and repeating the operation, 120 ounce-measures of air were obtained, and the whiting was reduced to 730 grains. A third operation, in which another quarter of an ounce of vinegar was added, reduced the matter to 459 grains: but the last portion of air extracted had no fixed air, and was considerably better than that of the atmosphere.—The other experiment was made with lime-stone alone; from four ounces of the white crysall, of which 830 ounce-measures of air were obtained, the first portion of which had only one-fourth of fixed air, and the standard of the residuum was never better than 1.56, nor worse than 1.66; so that it was nearly of the goodness of common air.

Our author then proceeds to relate several other experiments in which the nitrous acid was decomposed; but a particular relation of them would swell this article beyond its due bounds. At last, however, he concludes in the following manner. "If spirit of nitre be made to boil, and its vapour received through a red-hot earthen tube, it will be converted into dephlogisticated air, in which a portion both of phlogisticated and fixed air is found, as Dr Priestley has discovered: the water through which this air passes will also contain fixed air. Here then are several ways of decomposing the nitrous acid; and in one only it is resolved into nitrous and dephlogisticated air; and in this way it may, at least, be strongly suspected to receive an addition of another principle. Why then should these be regarded as its constituent principles? And as in the two different methods of decomposition, in which the re-acid of no foreign substance can be fixed, it appears in the form of dephlogisticated, phlogisticated, and fixed air (the former always containing a portion of the two last), why then should not the air be accounted its true constituent parts?—This theory is further confirmed by reflecting on the manner in which nitrous acid is generated by nature. Mr Thouvenel found that this acid is constantly produced when chalk is exposed to a mixture of nitrid and common air, or purified and dephlogisticated air; but if the purified air be passed through lime-waters, it is never generated; and that it is rarely produced by the exposure of quick lime or fixed alkalis to these airs. The reason that alkalis, though aërated, are not so proper, is, that they do not combine with phlogisticated air as calcareous earths do. Mr Cavendish, indeed, produced nitrous acid without any apparent mixture of fixed air; but the atom of it necessary for the formation of the small quantity of nitrous acid he produced (about one-third of a grain), might well be contained in the phlogisticated air he employed, or perhaps formed in the operation."

Having thus far stated the different opinions of the most celebrated French and English philosophers concerning the composition of acids, it is necessary to take notice of some experiments made by Mr. Watt, in order to determine whether the dephlogisticated air produced from nitre really proceeds from a decomposition of the acid, or what quantity of the latter is required to constitute a determinate quantity of the former. To ascertain this, 240 grains of mercury were put into a glais retort with 480 grains of diluted dephlogisticated nitrous acid, which was the * dephlogisticated air of Kirwan's doctrine. A quantity necessary to dissolve the whole of the mercury; and as soon as the common air was expelled, a proper vessel was applied to receive the air produced in the operation. Sixteen ounce-measures of nitrous air came over during the solution, and on changing the receiver, a quantity of dilute, but highly phlogisticated nitrous acid, was obtained. The air receiver being again applied, four ounce-measures of strong and pure nitrous air were obtained, which, by the dephlogisticated air that arose immediately after, were reduced to half an ounce-measure. The production of dephlogisticated air continued very rapid, the mercury being all the while received, until the distillation or sublimation of the whole of the mercury. Two hundred and eighty grains of the metal were obtained in its running form, and 22 remained in the form of an orange-coloured sublimate in the upper part of the retort.—The 16 ounce-measures of nitrous air, first obtained, were then converted into nitrous acid by the gradual admission of common air, and then added to the water in the bason in which the receiver had been inverted; the whole quantity being about two quarts, and very acid to the taste, sparkling at the same time with nitrous air. To determine the quantity of acid thus recovered, as well as that which remained in the sublimate, a solution of alkali of tartar was made; and by experiment it was found, that 120 grains of the acid, originally employed in dissolving the mercury, saturated 325 grains of this solution; the orange-coloured sublimate and all the acid liquor recovered being saturated by 1395 grains of the same. Hence it appears, by the rule of proportion, that out of 480 grains of nitrous acid originally employed, only five were lost: "a smaller quantity (as Mr Watt justly observes) than what might reasonably be supposed to be lost in the processes by the extreme volatility of the nitrous acid." His conclusion therefore is, that "the nitrous acid does not enter into the composition of dephlogisticated air: it seems only to serve to absorb phlogiston from the watery part of the mercurial nitre."

This experiment was repeated with cubic nitre, and only 50 ounce-measures of air distilled from an ounce of the mineral alkali exactly saturated with nitrous acid. The water through which the air passed was acid, and the residuum in the retort alkaline; but on mixing the two together, the solution was found to be exactly neutral by every possible test.

Not satisfied with these experiments, Mr. Watt distilled an ounce (430 grains) of common nitre, dropping the whole process when 50 ounce-measures of air had been produced. This air had a strong smell of the nitrous
Acids.

Nitrous acid, from which it could not be freed by washing with the water in the basin. The residue in the retort was alkaline as before, and the water slightly acid; nor was the saturation completed by mixing the two together. Ten grains of weak nitrous acid, 105 grains of which contained the acid of 60 of nitre, completed the saturation. These ten grains contained the acid of 57 grains of nitre; which, by Mr Kirwan's experiments, is equal to two grains of real nitrous acid.

We have therefore (says Mr Watt) 34 grains weight of dephlogisticated air produced, and only two grains of real air produced; and it is not certain that even this quantity was destroyed, because some portion of the glass of the retort was dissolved by the nitre, and some part of the materials employed in making the glass being alkaline, we may conclude, that the alkali of the nitre would be augmented by the alkali of that part of the glass it had dissolved; but as the glass cracked into small pieces on cooling, and some part of the coating adhered firmly to it, the quantity of the glass that was dissolved could not be ascertained.

To avoid the force of objections drawn from these experiments, and which seem ready to overthrow his hypothesis, as well as that of Mr Lavoisier entirely, Mr Kirwan makes the following reply: "My ingenious friend Mr Watt, as well as Mr Cavendish, are of opinion, that the whole quantity of dephlogisticated air, produced from the distillation of glass, arises from the dephlogistication of the water it contains, it being decomposed by the nitrous acid, which then becomes phlogisticated. This opinion is exposed to insurmountable difficulties. For, in the first place, nitre affords dephlogisticated air at the rate of 146.125 cubic inches for every hundred grains of nitre, which, by the proper allowances for phlogisticated air, should weigh 46.77 grains; but then dephlogisticated air is only one of the constituent parts of water, for it contains 13 per cent. of inflammable air, that is to say, 87 grains of dephlogisticated air; to form 100 grains of water requires an addition of 13 grains of inflammable air; consequentiy 46.77 grains of dephlogisticated air require nearly 7 of inflammable air, and would then form 53.77 grains of water, which exceeds half the weight of the nitre; a quantity of water, as Mr Watt owns, certainly inadmissible. Mr Watt found, that the water over which the air passing from the decomposition of 960 grains of nitre had been received, contained only the acid belonging to 120 grains of nitre; and even this small quantity he inferred only from my experiments. But my experiments are totally inapplicable in this case; for I used only the dephlogisticated nitrous acid: and alkalis are saturable by a much smaller quantity of phlogisticated than of dephlogisticated acids, as is evident in the case of the dephlogisticated muriatic acid, as Stahl long ago observed; for he says, that the volatile acid of sulphur faturates 10 times as much alkali as the fixed. Mr Bergman and Mr Scheele observed, that melted nitre is still neutral, though it be phlogisticated; therefore it is air, and not water, which it wants. Accordingly Dr Priestley found it to injure common air by attracting its dephlogisticated part; but if it be kept in fusion for some time, it loses its acid, and becomes alkaline, and the air it receives must surely be deemed rather to recompose the acid than to form water; of whose formation, in the temperature of the atmosphere, we have no sort of proof. On the contrary, the impossibility of accounting for the loss of acid in this case is an evident proof of the fallacy of that hypothesis. — Mr Lavoisier's analysis, 100 grains of nitre contain 57 of car­
cil alkali; by Mr Bergman's, 59; by Mr Wenzel's, 52; by Mr Wiegleb's, 45; by mine, 63; the mean of all which, is 53; which leaves 4.5 for acid and water, which is very nearly the weight of the air expelled. The different quantity of acid affixed by different peroxis to nitre, is in part owing to its degree of phlogistication in nitre. I believe at present that 100 grains of nitre contain 34 of acid, and about 12 of water, including the water in the acid and that of crystallization."

Mr Kirwan next proceeds to consider, in a manner similar to that above related, the composition of the other acids. — The marine acid, according to him, consists of a peculiar basis united to phlogiston, and a certain quantity of fixed air; to both of which the basis seems to have a strong affinity. On depriving it of this phlogiston, the affinity of the acid to fixed air becomes much stronger, and it fatuates itself to a large extent with it, the attractions for other substances, containing little or no phlogiston, become nearly as weak as those of fixed air itself when equally condensed; but with respect to bodies that contain a considerable quantity of phlogiston, its affinities are much stronger, as its basis attracts the phlogiston, while those bodies attract its excess of fixed air. In this state it does not expel fixed air from the fixed alkalies or earths until it is heated; and then dephlogisticated air separates from it, and it becomes, in all respects, common marine acid. For as it contains an excess of fixed air, it acts nearly as an acid of the same nature; but when heat is applied, its basis dephlogisticates its own fixed air, which then becomes dephlogisticated air, at the same time that the acid becomes common marine acid, and acts as such.

Mr Lavoisier, and other philosophes, who deny the existence of phlogiston, are of opinion, that the common marine acid consists of a peculiar basis united to a small proportion of pure air, or oxygenous principle, and the dephlogisticated marine acid differs from it only by containing an excess of this principle. — This opinion they are chiefly induced to maintain, because the acid in its dephlogisticated state is procured by distilling common marine acid from manganite; and the manganite, if distilled by itself, before the acid is distilled from it, affords dephlogisticated air; but after the acid is distilled from it, it yields none. — "This experiment, however, (says Mr Kirwan) proves no more by Mr Kirwan but that the manganite contains some air which is dephlogisticated during the calcination. And that this air is fixed air, appears from the following considerations: The black cals of manganite always gives out fixed air at first, before any dephlogisticated air appears: whence it is natural to think, that the dephlogisticated air proceeds from the dephlogistication of the fixed. And hence, if it be distilled with filings of iron, or in a gun-barrel, it first gives out any other than fixed air; if at any time it gives out dephlogisticated air, with little or no mixture of fixed air, this transduces to a very perfect dephlogistication of the cals, and to its containing very little moisture. Thus Dr Priestley, having
Decisive experiment in his favour.

Several other experiments are related by Mr. Kirwan, which the limits of this article will not allow us to insert; but the following, he is of opinion, fully confirms your experiment which the limits of this article will not allow us to discuss.

Phosphoric acid.

The other acids particularly treated of by Mr. Kirwan are the phosphoric and saccharine. In his treatise on the former, he adopts the analysis of Mr. Lavoisier, changing only his acid principle of dephlogisticated fixed air. From this it appears, that the phosphoric acid consists of a peculiar basis united to 2.265 of its weight of the acid principle; or, in other words, 100 grains of dry phosphoric acid contains about 69 of fixed air and 31 of its peculiar basis; 100 grains of the phosphoric basis take up 226.5 of fixed air, or 32.6 of phlogiston when it becomes phosphoric acid; and 100 grains of phosphorus contain 75.24 of basis and 24.76 of phlogiston.

Fixed air.

The acid of sugar be distilled, it is wholly converted into the acid principle, according to Mr. Kirwan, which is far from being the case, that it is universally agreed to be much less; Bergman making it only.

Saccharine acid.

If the saccharine acid be distilled of fixed acid, or converted of that substance undecomposed, and barely united to the oxigenous principle, it ought to be formed by treating sugar with the black calx of manganese, or with dephlogisticated marine acid; both of which, according to him, have less attraction for the oxigenous principle than sugar. Lastly, (says Mr. Kirwan), if the acid of sugar be distilled, it is wholly converted into the acid principle, and not a particle of coal, or dephlogisticated air is found in it. It is not therefore reasonable to look on either of them as constituting principles; but as fixed air alone can be extracted from all vegetable acids, it seems to be the true acidifiable principle.

Having given a view of the present opinions relative to the original formation of acids, it remains to treat a little more particularly of each of the different kinds.

(a) On mixing these, a dense white cloud appears; one half the bulk of both disappears, and the residuum explodes like a mixture of inflammable and dephlogisticated air.
kinds. They are divided into three different classes, expressive of their origin, viz. the Mineral, Vegetable, and Animal. The mineral acids are those of vitriol, nitre, fessa-falt, borax, amber, flour, arctic, tungsten, molybdæna, &c. The vegetable are, those of vinegar, tartar, figar, benzoin, apples, citrons, lemons, tamarinds, forcell, cork, &c. The animal acids are, the microscopic or acid of urine, and that of bones, both of which are also called the phosphenous, though this might be accounted a vegetable acid, as it is procured by diffilting mustard and some other vegetables by a violent fire. Besides these, there are the acids of ants, wasps, bees, flick-worms, milk, &c. It has also been discovered, that the human calculus is formed for the most part of a peculiar acid, which has received the name of lithius acid. Lastly, As an acid distinct from all these, we may now add fixed air, by some called the aerial, and by others the cretesous acid; the latter appellation it derives from create, chalk, because it is found in that substance in great quantity. See AEREOLOGY.

The general properties of acids have already been enumerated; the most remarkable of which is their attraction for alkaline fads, earths, and metals. Though this is common to all, yet very considerable differences are observed among them in this respect, and on those differences depend almost all the phenomena of that part of chemistry which treats of fads. As these phenomena are particularly considered under that article, we shall here only in general take notice, that the three acids named the vitriolic, nitrous, and marine, are the strongest of them all; that is, if any other acid be united to an alkalii, earth, or metal, the union will be broken by adding to that compound any of the three acids just mentioned. Neither are these equal in power among themselves; for the vitriolic is stronger than the nitrous, and the nitrous stronger than the marine. The rule, however, is liable to certain exceptions and variations, depending chiefly on the circumstances of heat or cold, moisture or dryness, and particularly on the state of the marine acid with regard to its being in the form of an aqueous fuid or reduced to a dry vapour. In this last cafe it seems stronger than either the vitriolic or nitrous; and even when in an aqueous fiate, both the nitrous and marine fads, when added in great quantity, seem to oppose and overwhelm the stronger vitriolic acid, fo that they will partly expel it from an alkaline falt. This does not depend on the mere quantity of acidity they pollute: for the acceous acid may be concentrated to a degree as to become stronger in this respect than spirit of fad; yet it will always be inferior in point of real strength, when tried with an alkalii in competition with the latter. The aerial acid is the weakest of all; and may be expelled not only by vinegar, but by the acid jui'es of fruits, tartar, and the acids of tungsten and molybdæna.

Some acids have the property of refilling the fire, and melting into a kind of glass, such as that of borax and phosphorus. This circumstance gives them an advantage over the stronger acids which are volatile; and thus the two just mentioned, as well as those of arctic and tungsten, will, in a very strong heat, expel the acid of vitriol itself, though the latter will, in the cold, expel any one of them with great ease.

Both the vitriolic and nitrous acids have a very strong attraction for phlogition; and unite with certain oily and inflammable matter so vehemently as to occasion great heat, and sometimes even violent and unextinguifiable flame. This is particularly the case with the nitrous acid, or with a mixture of the two; and indeed the nitrous acid, though weaker than the vitriolic, flows itself in every instance to be far more active, and to perform all its operations with vastly greater rapidity, than the other. All these particular, however, as they properly fall under the article CHEMISTRY, are here explained at length: together with the origin and peculiar methods of preparing each of the acids, and the various uses to which they may be applied in arts and manufactures. See also their different titles as they occur in the order of the alphabet; as, Nitre, Vinegar, Vitriol, &c.

ACIDULOUS denotes a thing that is slightly acid; it is synonymous with the word but-acid.

ACIDULÆ. Mineral waters that contain a brisk spirit, when unaccompamed with heat, are thus named; but if they are hot also they are called THERMAE. See MINERAL WATERS.

ACIDULATED, a name given to medicines that have an acid in their composition.

ACIDUM AERÆUM, the same with Fixed Air. Acidum pingue, an imaginary acid, which some German chemists suppos'd to be contained in fire, and by combining with alkalies, lime, &c. to give them their caustic properties; an effect which is found certainly to depend on the fof of their fixed air.

ACILA, OCILA, or OCELIS (anc. geog.), a flape or mart town in Arabia Felix, on the Arabic gulf, from which, according to Pliny, they fett fai for India. Now Ziden.

ACILIUS GLABRIO (Marcus), conful in the year of Rome 562, and 211 years before the Christian era, di.stinguished himself by his bravery and conduct in gaining a complete vitory over Antiochus the Great, king of Syria, at the ftreights of Thermopylae in Thellafy, and on feveral other occasions. He built the Temple of piety at Rome, in confquence of a vow he made before the abovementioned battle: and the reafon of his giving it that name is very remarkable. The story is mentioned by Pliny, Valetiius Maximus, and others. See the article PIETY.

ACINIPPO (anc. geog.), a town of Boetiae; its ruins, called Ronda la Vega, are to be feen near Arunda, in the kingdom of Granada.

ACINODENDRUM, in botany, the trivial name of a species of MELASTOMA.

ACINOS, in botany, the trivial name of a species of THYMUS.

ACINS, or ACINI, the small protuberances of mulberries, strawberries, &c. and by some applied to grapes. Generally it is used for those small grains growing in bunches, after the manner of grapes, as LIGUSTRUM, &c.

ACIS, in fabulous hisory, the fon of Faunus and Simethes, was a beautiful shepherd of Sicily, who being beloved by Galatea, Polyphemus the giant was so enraged, that he daifed out his brains against a rock; after which Galatea turned him into a river, which was called by his name.

ACIS, (Ovid, Theocritus); a river of Sicily, running from a very cold spring, in the woody and shady foot
foot of mount Aetna, eastward into, and not much above a mile from the sea, along green and pleasant banks, with the iped of an arrow, from which it takes its name. It is now called Acit Lambi, or Ghirli, according to the different Sicilian dialects: Antonine calls it Acis. Also the name of a hamlet at the mouth of the Aci.

ACKNOWLEDGMENT, in a general sense, is a person's owning or confessing a thing; but, more particularly, is the expression of gratitude for a favour.

ACKNOWLEDGMENT-MONEY, a certain sum paid by tenants, in several parts of England, on the death of their landlords, as an acknowledgment of their new lords.

ACLIDES, in Roman antiquity, a kind of missile weapon, with a thong affixed to it, whereby to draw it back. Most authors describe it as a kind of dart or javelin; but Scaliger makes it roundish or globular, and full of spikes, with a slender wooden stem to point it by.

ACLOWA, in botany, a barbarous name of a species of Colutea. It is used by the natives of Guiana to cure the itch: They rub it on the body as we do unguents.

ACME, the top or height of anything. It is usually applied to the maturity of an animal just before it begins to decline; and physicians have used it to express the utmost violence or crisis of a disease.

ACMELLA, in botany, the trivial name of a species of Spilanthes.

ACMONIA, and ACAMONIA, in Peutinger's map, a town of Phrygia Major, now in ruins. The inhabitants are called Acumonenses by Cicero, and the city Civitas Aemontis. Also a city of Dacia (Philomcy), on the Danube, near the ruins of Trajan's bridge, built by Severus, and called Severianum; distant 12 German miles from Temeswar, to the south-east.

ACNIDA, VIRGINIAN HEMP, in botany, a genus of the dioecia order, belonging to the pentandria class of plants; and, in the Natural Order, associating with the Scabridae (53). The characters are: In the male, the calyx is a perianthium consisting of five leaves, ovate, concave, acute, and membranous on the margin. No corolla. The stamina consist of five very short capillary filaments; the anthers are versatile, two-celled, and forked at both ends. Female on a separate plant; of which the calyx consists of an involucre many-leaved, linear, and deciduous; and a perianthium two-leaved, very small, and perfect. No corolla. The pistillum has an ovate germen; the stigmas are five, long, reflexed, and downy; the filaments are simple. The pericarpium is an egg-shaped fruit, compressed, many-angled, fulcated, and covered with a succulent calyx. The seed is solitary, round, and compressed. There is only one species of it, viz. the acnida cannabida. It's a native of Virginia; but rarely cultivated in Europe, except for the sake of variety. It has little beauty, and at present is applied to no useful purpose.

ACNUEA, in Roman antiquity, signified a certain measure of land, near about the English rood, or fourth part of an acre.

ACOEMETÆ, or ACOEMETI, in church-history; or, Men who lived without sleep: A fret of monks who chanted the divine service night and day in their places of worship. They divided themselves into three bodies, who alternately succeeded each other, so that their churches were never silent. This practice they founded upon the precept, Pray without ceasing. They flourished in the east about the middle of the 5th century. There are a kind of acoemeti still subsisting in the Roman church, viz. the religious of the holy facrament, who keep up a perpetual adoration, some one or other of them praying before the holy sacrament day and night.

ACOLUTHI, or ACOLUTHISTS, in antiquity, was an appellation given to those persons who were steady and immovable in their resolutions: and hence the title of those, because they would not forfake their principles, nor alter their resolutions, acquired the title of Acoluthi. The word is Greek, and compounded of α, priv. and κολυθω, away; as never turning from the original course.

ACOLUTHI, among the ancient Christians, implied a peculiar order of the inferior clergy in the Latin church; for they were unknown to the Greeks for above 400 years. They were next to the sub-deacon; and we learn from the fourth council of Carthage, that the archdeacon, at their ordination, put into their hands a candlestick with a taper, giving them thereby to understand that they were appointed to light the candles of the church, as also an empty pitcher, to imply that they were to furnish wine for the eucharist. Some think they had another office, that of attending the bishop wherever he went. The word is Greek, and compounded of α, priv. and κολυθω, to hinder or disturb.

ACOLYTHIA, in the Greek church, denotes the office or order of divine service; or the prayers, ceremonies, hymns, &c. whereas the Greek service is composed.

ACOMAC, a town of North America, in New Mexico, seated on a hill, with a good cattle. To go into the town, you must walk up 50 steps cut out of the rock. It is the capital of that province, and was taken by the Spaniards in 1599. W. Long. 104. 15. L. 35. 0.

ACOMAC or ACOMACK, the name of a county in Virginia. It is on the eastern side of the Chesapeake bay, on a slip of land, called the eastern shore.

ACOMINATUS (Niceria), was secretary to Alexius Comnenus and to Isaacas Angelus successively: he wrote an history from the death of Alexius Comnenus 1118, where Zonaras ends his, to the year 1209, which has undergone many impressions, and is much applauded by the best critics.

ACONITI, See ACONITUM.

ACONITUS, See ACONITUM.

ACONITO, See HELEDOURUS.

ACONCROBA, in botany, the indigenous name of a plant which grows wild in Guinea, and is in great esteem among the natives for its virtues in the small-pox. They give an infusion of it in wine. The leaves of this plant are opaque, and as flat as those of the phile; they grow in pairs, and stand on short foot-stalks; they are small at each end, and broad in the middle; and the largest of them are about three inches in length, and an inch and quarter in breadth in the middle. They are of a dusky colour on the upper side, and of a pale green underneath.
ACONITI, in antiquity, an appellation given to some of the Atules, but differently interpreted. Mercantilists understand it of those who only anointed their bodies with oil, but did not flexure themselves over with dust, as was the usual practice.

ACONITUM, Aconite, Wolfsbane, or Monkhood; a genus of the trigyna order, belonging to the polyandria clafs of plants. In the natural order, it associates with the Multiflora, 26. The characters are: There is no calyx. The corolla consists of five unequal petals opposite in pairs; the highest helmet-tube, inverted, and obtuse; the twolateral ones, broad, roundish, opposite, and converging; the two lowest, oblong, and looking downwards: The sepalia are two, piped, nodding, and sitting on long subulate peduncles, and concealed under the highest petal: The scales are six, very short, coloured, and in an orb with the sepalia. The flamina consists of numerous small subulate filaments; the anthers are creft and small. The pistillum has three [five] oblong germen, ending in filii the length of the flamina; the stigmata are simple and reflected. The pericarpium has three or five univalve capsules gaping inward. The seeds are numerous, angular, and wrinkled.

Species. 1. The lycoceum, or yellow wolfsbane, grows in hedges of three feet high, flowers about the middle of June, and if the seafon is not warm will continue in flower till August. 2. The atlimum, or greatest yellow wolfsbane, grows upwards of four feet high, and the spikes of its flower are much longer in this sort than the former. 3. The variegatum, or leifer wolfsbane, seldom grows more than two feet high, it carries blue flowers, and the spikes of them are much shorter than either of the two last. 4. The anthes, or wholefome wolfsbane, flowers in the middle of August, and often continues in beauty till the dear of September; its flowers are not large, but are of a beautiful phosphor-yellow colour. 5. The napellus, bears large blue flowers, which appear in August, and make a pretty appearance. There are two or three varieties of this kind; one with white, another with rofe-coloured, and a third with variegated flowers: but these are only varieties which often change. 6. The Pyramidal, or common monkhood, bears a long spike of blue flowers, which appear sooner than any of the other forms, being fo early as June, or sometimes even May. The spikes of flowers are upwards of two feet long, so that it makes a pretty appearance; the seeds are ripe in September. 7. The alpinum, or large-flowered monkhood, flowers in August, and will grow to the height of five feet in good ground; the flowers are very large, of a deep blue colour, but not many upon each spike. 8. The pyreniacum, or Pyrenean monkhood, flowers in July. It grows about four feet high, and carries a long spike of yellow flowers. 9. The cammarum, grows about four feet high, and flowers in the beginning of July. 10. The orientale, or eastern monkhood, grows sometimes more than fix feet high, and bears a white flower.

Culture. All thefe species, except the laft, are natives of the Alps, the mountains of Germany, Austria, and Tartary; so require a cool shady situation, except the wholefome wolfsbane, which must have an open exposure. They thrive better in a moift than dry soil: but the ground muft not be so wet as to have the water flanding near their roots in the winter-time. Aconitum. They may all be propagated by leaving their seeds in autumn, upon a north border, where they are freced from the rain. The plants will come up in the spring, when they must be kept clean from weeds during the summer-months: and in very dry feasons, if they are frequently refted with water, their growth will be greatly promoted. The following autumn they should be transplanted into shady borders, in rows a foot aunder, and the plants fix inches distant from one another. In this situation they may remain two years, when they will carry flowers, and so may be transplanted to fole places where they are to remain. The eastern monkhood is a native of the Levant, from whence the seeds of it were first sent by Dr Tournfort to the royal garden at Paris, from whence fome other gardens have been furnished with feeds. It is very rare in Europe at present.

Qualities. Since the time of Theophrastus, moft of the species of monkhood have been reckoned a deadly poifon both to men and brutes. Diocorides, however, recommends the external application of common monkhood for pains of the eyes. The flowers of a great many species communicate their noxious quality by being smelted; and some of the species called noxialis being placed on the head, occasion a violent megrim. Of the bad qualities of thefe plants we sometimes avail ourselves to get rid of vermin. A decoction of the roots destroys bugs; the fame part being powdered, and administered in bread or fome other palatable vehicle to rats and mice, corrodcs and infames their intestines, and foon proves mortal. The juice of the plant is used to poifon flih with, for the destruction of wolves, foxes, and other ravenous brutes. The beft antidote to the poifon of the different monkheads is said to be the root of the anthes, a species of the fame genus, hence termed beneficial or wholefome monkhood. The fame plant is regarded as efficacious against bites of ferpents and other venomous creatures. The roots have a bitter acrid taste; the leaves are only bitter: the former are chiefly used in medicine; and, besides the excellent quality just mentioned, are ftoflictic, and promote perforation. The peasants, who gather the plants on the Alps and Pyrenees, are faid to use it with forcefs againft the biting of mad dogs, and to cure the cholical It is remarkable, that the monkheads with blue flowers are much more virulent than the yellow or white-flowered kinds. Miller afferts that the huntsmen of the wolves and other wild beasts on the Alps, dip their arrows into the juice of those plants, which renders the wounds made by them deadly.

That the anthes is an antidote to the poifon of the reft of the species, is not considered as a fact sufficiently established. Of the effects of the above, indeed, and other vegetable poifons, medical writers give but a confused account. In general, thofe which are not of the narcotic kind, nor excite violent vomiting and purgings, produce their pernicious effects by irritating the nervous coats of the fomach and intestines, as to occasion violent convulsions, not only in them, but, through the whole body. The proper cure is evacuation by vomit: but this is not to be obtained without some difficulty; because there is usually such a contraction about the upper orifice of the fomach, that nothing;
A C O N T I A S, in zoology, an obsoletene name of the anguis jugularis, or dart-snake, belonging to the order of amphibia serpentes. See ANGUIS.

A C O N T I U M, or contumacy, in Grecian antiquity, a kind of dart or javelin, resembling the Roman pilaum.

A C O N T U S (James), a philosopher, civilian, and divine, born at Trelton the 16th century; he embraced the reformed religion; and, coming into England in the reign of queen Elizabeth, which he acknowledges in a book dedicated to that queen. This work is his celebrated Collection of the Stratagemas of Satan, which has been so often translated, and borne so many editions.

A C O S T A N, a mountainous island in the north seas between Asia and America, observed by captain Cook.

A C O R N, the fruit of the oak-tree. See QUERCUS.

A C O R N, (in sea-language), a little ornamental piece of wood, fashioned like a cone, and fixed on the uppermost point of the spindle, above the vase, on the masthead. It is used to keep the vase from being blown off from the spindle in a whirlwind, or when the ship leans much to one side under sail.

A C O R U S, CALAMUS AROMATICUS, SWEETFLAG, or SWEET RUSH: a genus of the monocotylous order, belonging to the xantharia class of plants, and ranking in the second natural order, Piparieae. The characters are: The calyx is a cylindrical simple spadix covered with florets; there is no stamens, nor perianthium. The corolla is composed of six obtuse, concave, loose petals. The filaments consist of six thickish filaments, somewhat longer than the corolla; the anthers are thick and dicydous. The pistillum has a gibbon oblong germen the length of the filaments; no styles; the stigma a prominent point. The pericarpium is a short triangular, obtuse, three-celled capsule, attenuated at both ends.

The seeds are numerous, and of an oblong egg-shape.

There is but one species, the acorus calamus. It grows naturally in shallow standing waters, and is found wild in some parts of Britain. It grows plentifully in rivulets and marshy places about Norwich and other parts of the island, in the canals of Holland, in Switzerland, and in other countries of Europe. The shops have been usually supplied from the Levant with dried roots, which do not appear to be superior to those of other parts. The leaves are sometimes two feet long, narrow, compressed, smooth, and of a bright green, terminating in a point; the root is pretty long, of a whitish, reddish, and partly greenish colour. Among the leaves there arises a single one, thicker and more robust than the rest, furred on the surface, and of a paler green. On this grow frequently two spikes of flowers, by many writers called futili. These are of a brown colour, having a chequered surface. The root of this plant has a very agreeable flavour, which is greatly improved by drying. It is reckoned carminative and stomachic, having a warm, pungent, bitterish taste; it is frequently used as an ingredient in bitters. It has been complained of, however, as communicating a nauseous flavour to those bitters in which it was infused; and Neumann observes, that its agreeable flavour, as well as its distinguishing taste, resides entirely in a volatile essential oil; the residuum after distillation having a nauseous flavour, not at all resembling that of the calamus. It is an ingredient in the mithridate and theriac of the London pharmacopoeia; and in the aromatic and stomachic tinctures, and compound arum powder, of the Edinburgh. The fresh root candied is said to be employed at Constantinople as a preservative against epidemic diseases. The leaves of this plant have a sweet fragrant smell, more agreeable, though weaker than that of the roots. Neither horses, cows, goats, sheep, nor fwine, will eat the herb, or its root.

Culture. The acorus being a perennial plant, may be transplanted into a garden, where it will thrive very well if the ground is moist; but never flowers unless it grows in water. It loves an open situation, and will not thrive well under the shade of trees. The flowers appear the latter end of June, and continue till August.

A C O R U S, in the materia medica, a name sometimes given to the great galangal. See KEMPERIA.

A C O R U S, in natural history, blue coral. The true form is very scarce; some, however, is filled on the coasts of Africa, particularly from Rio del Re to the river of the Camarones. This coral is part of the merchandise which the Dutch trade for with the Camarones; that of the kingdom of Benin is also very much esteemed. It grows in form of a tree on a rocky bottom.

A C O U S M A T I C I, sometimes also called Acoustic, in Grecian antiquity, such of the disciples of Pythagoras as had not completed their five years probation.

A C O U S T I C, in general, denotes any thing that relates to the ear, the sense of hearing, or the doctrine of sounds.

A C O U S T I C D u d, in anatomy, the fame with meatus auditorius, or the external passage of the ear. See ANATOMY.

A C O U S T I C I n s t r u m e n t , or auricular tube. See A C O U S T I C S, n° 26.

A C O U S T I C V e s s e l s, in the ancient theatres, were a kind of vessels made of brass, shaped in the bell fashion, which being of all tones within the pitch of the voice or even of instruments, rendered the sounds more audible, so that the actors could be heard through all parts of theaters, which were even feet in diameter.

A C O U S T I C D i s c i p l e s, among the ancient Pythagoreans, those more commonly called Acoustmatically.
ACOUSTICS

Dialectics

INSTRUCTS us in the nature of sound. It is divided by some writers into Dialectics, which explains the properties of those sounds that come directly from the sonorous body to the ear; and Catacogistics, which treats of reflected sounds: but such distinction does not appear to be of any real utility.

Chap. I. Different theories of Sound.

Of the vehicles of sound.

Most sounds, we all know, are conveyed to us on the bosom of the air. In whatever manner they either float upon it, or are propelled forward in it, certain it is, that, without the vehicle of this or some other fluid, we should have no sounds at all. Let the air be exhausted from a receiver, and a bell shall emit no sound when rung in the void; for, as the air continues to grow less dense, the sound dies away in proportion, so that at last its strongest vibrations are almost totally silent.

Thus air is a vehicle for sound. However, we must not, with some philosophers, assert, that it is the only vehicle; that, if there were no air, we should have no sounds whatsoever: for it is found by trial, that sounds are conveyed through water almost with the same facility with which they move through air. A bell rung in water returns a tone as distinct as if rung in air. This was observed by Derham, who also remarked that the tone came a quarter deeper. Some naturalists affirme also, that fishes have a strong perception of sounds, even at the bottom of deep rivers (A). From hence, it would seem to be not very material in the propagation of sounds, whether the fluid which conveys them be elastic or otherwise. Water, which, of all substances that we know, has the least elasticity, yet serves to carry them forward; and if we make allowance for the difference of its density, perhaps the sounds move in it with a proportional rapidity to what they are found to do in the elastic fluid of air.

One thing however is certain, that whether the fluid which conveys the note be elastic or non-elastic, whatever sound we hear is produced by a stroke, which the founding body makes against the fluid, whether air or water. The fluid being struck upon, carries the impression forward to the ear, and there produces its sensation. Philosophers are so far agreed, that they all allow that sound is nothing more than the impression sound is made by an elastic body upon the air or water (B), and how this impression carried along by either fluid to the organ of hearing. But the manner in which this conveyance is made, is still disputed: Whether the sound is diffused into the air, in circle beyond circle, like the waves of water when we disturb the smoothness of its surface by dropping in a stone; or whether it travels along, like rays diffused from a centre, somewhat in the swift manner that electricity runs along a rod of iron; these are the questions which have divided the learned.

Newton was of the first opinion. He has explained Newton's theory of sound by an undulatory, or rather a theory vermicular, motion in the parts of the air. If we have an exact idea of the crawling of some insects, we shall have a tolerable notion of the progression of sound upon this hypothesis. The insect, for instance, in its motion, first carries its contractions from the hinder part, in order to throw its fore-part to the proper distance; then it carries its contractions from the fore-part to the hinder to bring that forward. Something similar to this is

(A) Dr. Hunter has proved this, and demonstrated the auricular organ in these animals. See Fish, and Comparative Anatomy.

(b) Though air and water are both vehicles of sound, yet neither of them seems to be so by itself, but only as it contains an exceedingly subtle fluid capable of penetrating the most solid bodies. Hence, by the medium of that fluid, sounds can be propagated through wood, or metals, even more readily than through the open air. By the same means, deaf people may be made sensible of sounds, if they hold a piece of metal in their mouth, one end of which is applied to the founding body. As it is certain, therefore, that air cannot penetrate metals, we must acknowledge the medium of sound to be of a more subtle nature; and thus the electrical fluid will naturally occur as the proper one. But why then is found no longer heard in an exhausted receiver, if the air is not the fluid by which it is conveyed, seeing the electrical matter cannot be excluded? The reply to this is obvious: The electrical fluid is so exceedingly subtle, and pervades solid bodies with so much ease, that any motion of a solid body in a quantity of electrical matter by itself, can never excite a degree of agitation in it sufficient for producing a sound; but if the electrical fluid is entangled among the particles of air, water, wood, metal, &c. whatever affects their particles will also affect this fluid, and produce an audible noise. In the experiment of the air-pump, however, there may be an ambiguity, as the gradual exhausting of the air creates an increasing difference of pressure on the outside, and may occasion in the glass a difficulty of vibrating, so as to render it less fit to communicate to the air without the vibrations that strike it from within. From this cause the diminution of found in an exhausted receiver may be supposed to proceed, as well as from the diminution of the air. But if any internal agitation of its parts should happen to the electrical fluid, exceeding loud noises might be propagated through it, as has been the case when large meteors have kindled a great distance of the earth. It is also difficult to account for the exceeding great swiftness of found, upon the supposition that it is propagated by means of air alone; for nothing is more certain, than that the strongest and most violent gale is, in its course, inert and sluggish, compared with the motion of found.
in the motion of the air when struck upon by a sounding body. To be a little more precise, suppose ABC, the string of a harpichord drawn to a proper pitch, and drawn out of the right line by the finger at B. We shall have occasion elsewhere to observe, that such a string would, if let go, vibrate to E; and from E to D, and back again; that it would continue thus to vibrate like a pendulum for ever, if not externally resisted, and like a pendulum, all its little vibrations would be performed in equal times, the leaf and the first being equally long in performing; also, that, like a pendulum, its greatest swiftness would always be when it arrived at E, the middle part of its motion. Now then, if this string be supposed to fly from the finger at B, it is obvious, that whatever be its own motion, such also will be the motion of the parts of air that fly before it. Its motion, as is obvious, is first uniformly accelerated forward from B to E, then retarded as it goes from E to D, accelerated back again as it returns from D to E, and retarded from E to B. This motion being therefore sent in succession through a range of elastic air, it must happen, that the parts of one range of air must be first forward with accelerated motion, and then with a retarded motion. This accelerated motion reaching the remotest end of the first range will be communicated to a second range, while the nearest parts of the first range being retarded in their motion, and falling back with the reception of the string, retire first with an accelerated, then with a retarded motion, and the remotest parts will soon follow. In the mean time, while the parts of the first range are thus falling back, the parts of the second range are going forward with an accelerated motion. Thus there will be an alternate condensation and relaxation of the air, during the time of one vibration; and as the air going forward strikes any opposing body with greater force than upon retreating, so each of these accelerated progressions have been called by Newton a pulse of sound.

Thus will the air be driven forward in the direction of the string. But now we must observe, that these pulses will move every way; for all motion impressed upon fluids in any direction whatsoever, operates all around in a sphere: so that sounds will be driven in all directions backwards, forwards, upwards, downwards, and on every side. They will go on succeeding each other, one on the outside of the other, like circles in disturbed water; or rather, they will lie one without the other, in concentric shells, shell above shell, as we see in the coats of an onion. All who have remarked the tone of a bell, while its sounds are decaying away, must have an idea of the pulses of sound, which, according to Newton, are formed by the air's alternate progression and reception. And it must be observed, that as each of these pulses is formed by a single vibration of the string, they must be equal to each other; for the vibrations of the string are known to be so.

Again, as to the velocity with which sounds travel, this Newton determines, by the most difficult calculation that can be imagined, to be in proportion to the thickness of the parts of the air, and the dilance of these parts from each other. From hence he goes on to prove, that each little part moves backward and forward like a pendulum; and from hence he proceeds to demonstrate, that if the atmosphere were of the same density every where as at the surface of the earth, in such a case, a pendulum, that reached from its highest surface down to the surface of the earth, would by its vibrations discover to us the proportion of its velocity with which sounds travel. The velocity with which each pulse would move, he shows, would be as much greater than the velocity of such a pendulum swinging with one complete vibration, as the circumference of a circle is greater than the diameter. From hence he calculates, that the motion of sound will be 979 feet in one second. But this not being conformable to experience, he takes in another consideration, which destroys entirely the vigour of his former demonstration, namely, vapours in the air; and then finds the motion of sound to be 1142 feet in one second, or near 13 miles in a minute: a proportion which experience had established nearly before.

Thus much will serve to give an obscure idea of a preceding theory which has met with numbers of opposers. Even Theory of John Bernouilli, Newton's greatest disciple, moderately famed. He owned that he did not pretend to understand this part of the Principia. He attempted therefore to give a more perspicuous demonstration of his own, that might confirm and illustrate the Newtonian theory. The subject seems to reject elucidation; his theory is obviously wrong, as D'Alembert has proved in his Theory of Fluids.

Various have been the objections that have been made to the Newtonian system of sounds. It is urged, that this theory can only agree with the motion of sound in an elastic fluid, whereas sounds are known to move forward through water that is not elastic. To explain their progress therefore through water, a second theory must be formed: so that two theories must be made to explain a similar effect; which is contrary to the simplicity of true philosophy, for it is contrary to the simplicity of nature. It is farther urged, that this slow vermicular motion but ill represents the velocity with which sounds travel, as we know by experience that it is almost 13 miles in a minute. In short, it is urged, that such undulations as have been described, when coming from several sonorous bodies at once, would crowd, obstruct, and confound each other; so that, if they were conveyed to the ear by this means, we should hear nothing but a medley of discordant and broken articulations. But this is equally with the rest contradictory to experience, since we hear the fullest concert, not only without confusion, but with the highest pleasure. These objections, whether well founded or not, have given rise to another theory: which we shall likewise lay before the reader; though it too appears liable to objections, which shall be afterwards mentioned.

Every sound may be considered as driven off from another the sounding body in straight lines, and impressed upon Theory, the air in one direction only: but whatever impression is made upon a fluid in one direction, is diffused upon its surface into all directions; so that the sound first driven directly forward does fill up a wide sphere, and is heard on every side. Thus, as it is impressed, it instantaneously travels forward with a very swift motion, resembling the velocity with which we know electricity flies from one end of a line to another.

Now, as to the pulses, or close shocks, as the musicians express it, which a sounding body is known to make
Chap. 1. ACOUSTICS

Theories of Sound.

Different

make, each pulse (say the supporters of this theory,) is itself a distinct and perfect sound and the interval between every two pulses is profoundly silent. Continuity of sound from the same body is only a deception of the hearing; for as each distinct sound succeeds at very small intervals, the organ has no time to transmit its images with equal swiftness to the mind, and the interval is thus lost to sense; just as in facing a flaming torch, if flared round in a circle, it appears as a ring of fire. In this manner a beaten drum, at some small distance, presents us with the idea of continuing sound. When children run with their sticks along a rail, a continuing sound is thus represented, though it need scarce be observed that the stick is not always returned in the same body. All bodies whatever that are struck return more or less a sound; but some, wanting elasticity, give back no repetition of the sound; the noise is at once begotten and dies; while other bodies, however, there are, which being more elastic and capable of vibration, give back a sound, and repeat the same several times successively. These last are said to have a tone; the others are not allowed to have any.

This tone of the elastic string, or bell, is notwithstanding nothing more than a similar sound to what the former bodies produced, but with the difference of being many times repeated while their note is but single. So that, if we would give the former bodies a tone, it will be necessary to make them return their sound, by repeating our blows swiftly upon them. This will effectually give them a tone; and even an unmusical instrument has often had a fine effect by its tone in our concerts.

Let us now go on then to suppose, that by swift and equally continued strokes we give any non-elastic body its tone: it is very obvious, that no alterations will be made in this tone by the quickness of the strokes, though repeated ever so fast. Thence will only render the tone more equal and continuous, but make no alteration in the tone it gives. On the contrary, if we make an alteration in the force of each blow, a different tone will then undeniably be excised. The difference will be fatal; it must be confessed; for the tones of these inelastic bodies are capable but of small variation; however, there will certainly be a difference. The table on which we write, for instance, will return a different sound when struck with a club, from what it did when struck only with a twitch. Thus non-elastic bodies return a difference of tone, not in proportion to the swiftness with which their sound is repeated, but in proportion to the greatness of the blow which produces it; for in two equal non-elastic bodies, the body produced the deepest tone which was struck by the greatest blow.

We now then come to a critical question. What is it that produces the difference of tone in two elastic sounding bells or strings? Or what makes one deep and the other shrill? This question has always been hitherto answered by saying, that the depth or height of the note proceeded from the slowness or swiftness of the times of the vibrations. The slowest vibrations, it has been said, are qualified for producing the deepest tones, while the swiftest vibrations produce the highest tones.

In this case, an effect has been given for a cause. It is in fact the force with which the sounding string strikes the air when struck, that makes the true distinction in the tones of sounds. It is this force, with greater or less impression, resembling the greater or less force of the blows upon a non-elastic body, which produces correspondent affections of sound. The greatest forces produce the deepest sounds: the high notes are the effect of small efforts. In the same manner a bell, wide at the mouth, gives a grave sound; but if it be very mally withal, that will render it still graver; but if mally, wide, and long or high, that will make the tone deepest of all.

Thus, then, will elastic bodies give the deepest sound, in proportion to the force with which they strike the air: but if we should attempt to increase their force by giving them a stronger blow, this will be in vain; they will still return the same tone, for such is their formation, that they are numerous only because they are elastic, and the force of this elasticity is not increased by our strength or the greatness of a pendulum's vibration will not be increased by falling from a greater height.

Thus far of the length of chords. Now as to the frequency with which they vibrate the deepest tones, it has been found, from the nature of elastic strings, that the longest strings have the widest vibrations, and consequently go backward and forward slowest; while, on the contrary, the shortest strings vibrate the quickest, or come and go in the shortest intervals. From hence those who have treated of sounds, have inferred, as was said before, that the tone of the string depended upon the length or the shortness of the vibrations. This, however, is not the case. One and the same string, when struck, must always, like the fame pendulum, return precisely similar vibrations; but it is well known, that one and the same string, when struck, does not always return precisely the same tone: so that in this case the vibrations follow one rule, and the tone another. The vibrations must be invariably the same in the same string, which does not return the same tone invariably, as is well known to musicians in general. In the violin, for instance, they can easily alter the tone of the string an octave or eight notes higher, by a better method of drawing the bow; and some are known thus to bring out the most charming airs imaginable. These peculiar tones are by the English fiddlers called faltieter. The only reason, it has been alleged, that can be assigned for the same string thus returning different tones, must certainly be the different force of its strokes upon the air. In one case, it has double the tone of the other; because upon the soft touches of the bow, only half its elasticity is put into vibration.

This being understood (continue the authors of this theory,) we shall be able clearly to account for many things relating to sounds that have hitherto been inexplicable. Thus, for instance, if it be asked, When two strings are stretched together of equal lengths, tensions, and thickness, how does it happen, that one of them being struck, and made to vibrate
Acoustics.

Chap. I.

Different Theories of Sound.

Throughout, the other shall vibrate throughout also? the answer is obvious: The force that the string struck receives is communicated to the air, and the air communicates the fame to the similar string: which therefore receives all the force of the former; and the force being equal, the vibrations must be so too. Again, put the question, If one string be but half the length of the other, and be struck, how will the vibrations be? The answer is, The longest string will receive all the force of the string half as long as itself, and therefore it will vibrate in proportion, that is, through half its length. In the same manner, if the longest string were three times as long as the other, it would only vibrate in a third of its length; or if four times, in a fourth of its length. In short, whatever force the smaller string imparts upon the air, the air will imparts a similar force upon the longer string, and partially excite its vibrations.

From hence also we may account for the cause of those charming, melancholy gradations of sound in the Eolian lyre: an instrument (says Sir John Hawkins) late arrested upon the public as a new invention, though described above a century ago by Kircher.*

This instrument is easily made, being nothing more than a long narrow box of thin dale, about 30 inches long, 5 inches broad, and 1 inch diameter, pierced with small holes. On this side are seven, ten, or (according to Kircher) fifteen or more strings of very fine gut, stretched over bridges at each end, like the bridge of a fiddle, and screwed up or relaxed with screw-pins (a). The strings are all tuned to one and the same note; and the instrument is placed in some current of air, where the wind can blow over its strings with freedom. A window with the sash fastened to give the air admission, will answer this purpose exactly. Now when the entering air blows upon the strings with different degrees of force, there will be excited different tones of sound; sometimes the blast brings out all the tones in full concert; sometimes it sinks them to the softest murmurs; it feels for every tone, and by its gradations of strength solicits those gradations of sound which art has taken different methods to produce.

It remains, in the last place, to consider (by this theory) the loudness and softness, or, as the musicians speak, the strength and softness of sound. In vibrating strings, the loudness of the tone is in proportion to the depth of the note; that is, in two strings, all things in other circumstances alike, the deepest tone will be loudest. In musical instruments upon a different principle, as in the violin, it is otherwise; the tones are made in such instruments, by a number of small vibrations crowded into one stroke. The refined bow, for instance, being drawn along a string, its roughnesses catch the striking at very small intervals, and excite its vibrations. In this instrument, therefore, to excite loud tones, the bow must be drawn quick, and this will produce the greatest number of vibrations. But it must be observed, that the more quick the bow passes over the string, the less apt will the roughness of its surface be to touch the string at every instant; to remedy this, therefore, the bow must be drawn as its drawn quicker, and thus its fullest sound will be brought from the instrument.

If the swiftness of the vibrations in an instrument thus rubbed upon, exceed the force of the deeper found in another, then the swift vibrations will be heard at a greater distance, and as much farther off as the swiftness in them exceeds the force in the other.

By the same theory (it is alleged) may all the phenomena of musical sounds be easily explained.—The fables of the ancients pretend, that music was first found out by the beating of different hammers upon the smith’s anvil. Without purifying the fable, let us endeavour to explain the nature of musical sounds by a similar method. Let us suppose an anvil, or several similar anvils, to be struck upon by several hammers of different weights or forces. The hammer, which is double that of another, upon striking the anvil will produce a sound double that of the other: this double found musicians have agreed to call an Octave.

The ear can judge of the difference of resemblance of these sounds with great ease, the numbers being as one and two, and therefore, very readily compared. Suppose that an hammer, three times less than the first, strikes the anvil, the sound produced by this will be three times less than the first: so that the ear, in judging the similitude of these sounds, will find something more difficulty; because it is not so easy to tell how often one is contained in three, as it is to tell how often it is contained in two. Again, suppose that an hammer four times less than the first strikes the anvil, the ear will find greater difficulty still in judging precisely the difference of the sounds; for the difference of the numbers four and one cannot so easily be determined with precision as three and one. If the hammer be five times less the difficulty of judging will be still greater. If the hammer be six times less, the difficulty still increases, and so also of the seventh, inasmuch that the ear cannot always readily and at once determine the precise gradation. Now, of all comparisons, those which the mind makes most easily, and with least labour, are the most pleasing. There is a certain regularity in the human soul, by which it finds happiness in exact and striking, and easily-made comparisons. As the ear is but an instrument of the mind, it is therefore most pleased with the combination of any two sounds, the differences of which it can most dily distinguish. It is more pleased with the concord of two sounds which are to each other as one and two, than of two sounds which are as one and three, or one and four, or one and five, or one and six or seven. Upon this pleasure, which the mind takes in comparison, all harmony depends. The variety of sounds is infinite; but because the ear cannot compare two sounds as readily to distinguish their differences when they exceed the proportion of one and seven, musicians have been content to confine all harmony within that compass, and allowed but seven notes in musical composition.

Let us now then suppose a stringed instrument fitted up

(a) The figure represents the instrument with ten chords; of which some direct only eight to be tuned unison, and the two outermost octaves below them. But this seems not to be material.
Chap. 1.

ACOUSTICS.

Of musical sounds. For instance: Let the first string be twice as long as the second; let the third string be three times shorter than the first; let the fourth be four times, the fifth five times, and the sixth six times as short as the first. Such an instrument would probably give us a representation of the lyre, as it came first from the hand of the inventor. This instrument will give us all the seven notes following each other, in the order in which any two of them will accord together most pleasingly; but yet it will be very inconvenient and a very disagreeable instrument: inconvenient, for in a compass of seven strings only, the first must be seven times as long as the last; and disagreeable, because this first string will be seven times as loud as the others, so that when the tones are to be played in a different order, loud and soft sounds would be intermixed with most disgusting alternations. In order to improve the first instrument, therefore, succeeding musicians very judiciously threw in all the other strings between the two first; or, in other words, between the two octaves, giving to each, however, the same proportion to what it would have had in the first natural instrument. This made the instrument more portable, and the sounds more even and pleasing. They therefore disposed the sounds between the octaves in their natural order, and gave each its own proportional dimensions. Of these sounds, where the proportion between any two of them is most obvious, the concord between them will be most pleasing. Thus octaves, which are as two to one, have a most harmonious effect; the fourth and fifth also sound sweetly together, and they will be found, upon calculation, to bear the same proportion to each other that octaves do. "Let it not be supposed (says Mr. Savare), that the musical scale is merely an arbitrary combination of sounds; it is made up from the confluence and differences of the parts which compose it. Those who have often heard a fourth and fifth accord together, will be naturally led to discover their difference at once; and the mind unites itself to their resemblance. Let us then cease to assign the coincidences of vibrations as the cause of harmony, since these coincidences in two strings vibrating at different intervals, must at first be but fortuitous; whereas concord is a most pleasing. The true cause why concord is pleasing, must arise from our power, in such a case, of measuring more easily the differences of the tones. In proportion as the note can be measured with its fundamental tone by large and obvious dilations, then the concord is most pleasing; on the contrary, when the ear measures the disjunctions of two tones by very small parts, or cannot measure them at all, it looses the beauty of their resemblance; the whole is discord and pain (c).

But there is another property in the vibration of a musical string not yet taken notice of, and which is alleged to confirm the foregoing theory. If we strike the string of an harpsichord, or any other elastic sounding chord whatever, it returns a continuing sound. This till of late was considered as one simple uniform tone; but all musicians now confess, that instead of one tone it actually returns four tones, and that constantly. The notes are, besides the fundamental one, an octave above, a twelfth above, and a fourteenth. One of the bass notes of an harpsichord has been dissected in this manner by Ramond, and the actual existence of these notes proved beyond a possibility of being incontroverted. In fact, the experiment is easily tried; for if we firmly strike one of the lower keys of an harpsichord, and then take the finger briskly away, a tolerable ear will be able to distinguish, that, after the fundamental tone has ceased, three other thriller tones will be distinctly heard; first the octave above, then the twelfth, and lastly the fourteenth: the octave above is in general almost mixed with the fundamental tone, so as not to be easily perceived, except by an ear long habituated to the minute discrimination of sounds. So that we may observe, that the smallest tone is heard last, and the deepest and largest one first: the two others in order.

In the whole theory of sounds, nothing has given greater room for speculation, conjecture, and disapprobation, than this amazing property in elastic strings. The whole string is universally acknowledged to be in vibration in all its parts, yet this single vibration returns no less than four different sounds. They who account for the tones of strings by the number of their vibrations, are here at the greatest loss. Daniel Bernoulli supposes, that a vibrating string divides itself into a number of curves, each of which has a peculiar vibration; and though they all swing together in the common vibration, yet each vibrates within itself. This opinion, which was supported, as most geometrical speculations are, with the parade of demonstration, was only born soon after to die. Others have ascribed this to an elastic difference in the parts of the air, each of which, at different intervals, thus received different impressions from the string, in proportion to their elasticity. This is absurd. If we allow the difference of tone to proceed from the force, and not the frequency, of the vibrations, this difficulty will admit of an easy solution. These sounds, though they seem to exist together in the string, actually follow each other in succession; while the vibration has greater force, the fundamental tone is brought forward: the force of the vibration decaying, the octave is produced, but almost only instantaneously; to this succeeds, with diminished force, the twelfth; and, lastly, the fourteenth is heard to vibrate with great diminuendo, while the three other tones are always silent. These sounds, thus excited, are all of them the harmonic tones, whose differences from the fundamental tone are, as was said, strong, and distinct. On the other hand, the discordant tones cannot be heard. Their differences being but very small, they are overpowered, and in a manner drowned in the tones of superior difference yet not always neither; for Daniel Bernoulli has been able, from the same stroke, to make the same string bring out its harmonics and its discordant tones also (d). So that from hence we may justly infer, that every note whatsoever

(c) It is certain, that in proportion to the simplicity of relations in sound, the ear is pleas'd with its combinations; but this is not to be admitted as the cause why musicians have confined all harmony to an octave. Discriminated sounds, whose vibrations either never coincide, or at least very rarely, do not only cease to please, but violently grate the ear. Harmony and discord, therefore, are neither discriminated by the judgment of hearers, nor the institution of musicians, but by their own essential and immutable nature.

(d) Vide Memoires de l' Académie de Berlin, 1755, p. 153.
A C O U S T I C S.

Chap. I.

Of Musical Sounds.

12. Objections to the preceding theory.

The same battery, in conjunction with another of thirty-one jars, founded C sharp. So that a greater quantity of coated glass always gave a deeper note. Differences in the degree of a charge in the same jar made little or no difference in the tone of the explosion: if any, a higher charge gave rather a deeper note.

These experiments show us how much the gravity of different substances depends upon the quantity of air put in agitation by the founding body. We know that the noise of the electric explosion arises from the return of the air into the vacuum produced by the electric flash. The larger the vacuum, the deeper was the note; for the reason, the discharge of a musket produces a more acute note than that of a cannon, and thunder is deeper than either.

Besides this, however, other circumstances concur to produce different degrees of gravity or acuteness in sounds. The sound of a table struck upon with a piece of wood, will not be the same with that produced from a plate of iron struck by the same piece of wood, even if the blows should be exactly equal, and the iron perfectly kept from vibrating. Here the sounds are generally said to differ in their degrees of acuteness, according to the specific gravities or densities of the substances which emit them. Thus gold, which is the most dense of all metals, returns a much graver sound than silver; and metallic wires, which are more dense than them, return a proportionally greater sound. But neither does this appear to be a general rule in which we can put confidence. Bell-metal is denser than copper, but it by no means appears to yield a graver sound; on the contrary, it seems very probable, that copper will give a graver sound than bell-metal, if both are struck upon in their non-elastic state; and we can by no means think that a bell of pure tin, the least dense of all the metals, will give a more acute sound than one of bell-metal, which is greatly more dense. In some bodies hardness seems to have a considerable effect. Glass, which is considerably harder than any metal, gives a more acute sound; bell-metal is harder than gold, lead, or tin; and therefore sounds much more acutely; though how far this holds with regard to different substances, there are not a sufficient number of experiments for us to judge.

In bodies musically elastic, the whole substance vibrates with the lightest stroke, and therefore they always give the same note whether they are struck with a large or with a small instrument; so that striking a part of the surface of any body musically elastic is equivalent, in it, to striking the whole surface of a non-elastic one. If the whole surface of a table was struck with another table, the note produced would be neither more or less acute whatever force was employed; because the whole surface would then yield a sound, and so force could increase the surface: the sound would indeed be louder in proportion to the force employed, but the gravity would remain the same. In like manner, when a bell, or musical string, is struck, the whole substance vibrates, and a greater stroke cannot increase the substance. Hence we see the fallacy of what is said concerning the Pythagorean anvils. An anvil is a body musically elastic, and no difference in the tone can...
Chap. I. ACOUSTICS.

can be perceived whether it is struck with a large, or with a small hammer; because either of them are sufficient to make the whole substance vibrate, provided nothing but the anvil is struck upon: smiths, however, do not strike their anvils, but red-hot iron laid upon their anvils; and thus the vibrations of the anvil are stopped, so that it becomes a non-elastic body, and the differences of tone in the strokes of different hammers proceed only from the surface of the large hammers covering the whole surface of the iron, or at least a greater part of it than the small ones. If the small hammer is sufficient to cover the whole surface of the iron as well as the large one, the note produced will be the same, whether the large or the small hammer is used.

Lastly, the argument for the preceding theory, grounded on the production of what are called flute-notes on the violin, is built on a false foundation; for the bow being lightly drawn on an open string, produces no flute-notes, but only the harmonics of the note to which the string is tuned. The flute-notes are produced by the motion of the bow, quick and near the bridge, and by fingering very gently. By this management, the same sounds are produced, tho' at certain intervals only, as if the vibrations were transferred to the space between the end of the finger-board and the finger, instead of that between the finger and the bridge. Why this small part of the string should vibrate in such a case, and not that which is under the immediate action of the bow, we must own ourselves ignorant: nor dare we affirm that the vibrations really are transferred in this manner, only the same sounds are produced as if they were.

Though these objections seem sufficiently to overturn the foregoing theory, with regard to acute sounds being the effects of weak strokes, and grave ones of stronger impulsi, we cannot admit that longer or shorter vibrations are the occasion of gravity or acuteness in sound. A musical sound, however lengthened, either by striking or bending, is only a repetition of a single stroke, whose duration by itself is but for a moment, and is therefore termed inappreciable, like the instant of a particular motion of an electrical battery. The continuation of the sound is nothing more than a repetition of this instantaneous inappreciable noise after the manner of an echo, and it is only this echo that makes the sound agreeable. For this reason, music is much more agreeable when played in a large hall where the sound is reverberated, than in a small room where there is no such reverberation. For the same reason, the sound of a singing voice is more agreeable when it is heard in a large church than in a small room, as it is here the reverberating echo gives the voice that peculiar sonority which distinguishes one singer from another. The sound appears to be made up of different pulses, or repetitions of the sound produced by the strike of the hammer. It can by no means be allowed, that the note would be more acute though these pulses were to succeed one another more rapidly; the sound would indeed become more simple, but would still preserve the same tone. In musical strings the reverberations are vastly more quick than in bells; and therefore their sound is more uniform or simple, and consequently more agreeable than that of bells. In musical glasses*, the vibrations must be inconceivably quicker than in any bell, or stringed instrument: and hence they are of all others the most simple and the most agreeable, though neither the most acute nor the loudest. —As far as we can judge, quickness of vibration contributes to the uniformity, or simplicity, but not to the acuteness, nor to the loudness of a musical note.

It may here be objected, that each of the different pulses, of which we observe the sound of a bell to be composed, is of a very perceptible length, and far from being inappreciable; so that it is not fair to infer that the sound of a bell is only a repetition of a single instantaneous stroke, seeing it is evidently the repetition of a lengthened note. —To this it may be replied, that the inappreciable sound which is produced by striking a bell in a non-elastic state, is the very same which, being first propagated round the bell, forms one of those short pulses that is afterwards re-echoed as long as the vibrations of the metal continue, and it is impossible that the quickness of repetition of any sound can either increase or diminish its gravity.

Chap. II. Of the propagation of Sound. Newton's Doctrine explained and vindicated.

The writers on sound have been betrayed into the difficulties and obscurities, by rejecting the 47th proposition, B. ii. of Newton, as inconclusive reasoning. Of this proposition, however, the ingenious Mr. Young of Trinity college, Dublin, has lately given a clear, explanatory, and able defence. He candidly owns that the demonstration is obliquely stated, and takes the liberty of varying, in some degree, from the method of Newton.

1. The parts of all sounding bodies, (he observes), vibrate according to the law of a cycloidal pendulum: for they may be considered as composed of an indefinite number of elastic fibres; but these fibres vibrate according to that law. Vide Halstead, p. 270.

2. Sounding bodies propagate their motions on all sides in directam, by successive condensations and rarefactions, and successive going forward and returnings backward of the particles. Vide prop. 43. B. 2. Newton.

3. The pulses are the whole parts of the air which vibrate backwards and forwards; and which, by going forward, strike (pulsam) against obstacles. The latitude of pulse is the rectilinear space through which the motion of the air is propagated during one vibration of the sounding body.

4. All pulses move equally fast. This is proved by experiment; and it is found that they describe 1070 Paris feet, or 1142 London feet in a second, whether the sound be loud or low, grave or acute.

5. To determine the latitude of a pulse. Divide the space which the pulse describes in a given time (4) by the number of vibrations performed in the same time by the sounding body, (cor. 1. prop. 24. Smith's Harmonics), the quotient is the latitude.

M. Sauvage, by some experiments on organ-pipes, found that a body, which gives the gravest harmonic sound, vibrates 12 times and a half in a second, and that the grivelst bounding body vibrates 51.100 times in a second. At a medium, let us take the body which gives what Sauvage calls his fixed sound: it performs 100 vibrations in a second, and in the same time the pulses describe 1070 Parisian feet; therefore the space described by the pulses whilst the body vibrates once, that

* See Harmonics.
ACOUSTICS.

Plate I.

fig. 7.

that is, the latitude or interval of the pulse, will be 10.7 feet.

6. Prob. To find the Proportion which the greatest space, through which the particles of the air vibrate, bears to the radius of a circle, whose perimter is equal to the latitude of the pulse.

During the first half of the progress of the elastic fibre, or founding body, it is continually getting nearer to the next particle; and during the latter half of its progress, that particle is getting farther from the fibre, and these portions of time are equal (Helmham): therefore we may conclude, that at the end of the progress of the fibre, the first particle of air will be nearly as far distant from the fibre as when it began to move; and in the same manner we may infer, that all the particles vibrate through spaces nearly equal to that run over by the fibre.

Now, M. Sauveur (Acad. Sciences, an. 1700, p. 141) has found by experiment, that the middle point of a cord which produces his fixed sound, and whose diameter is 4/6 of a line, runs over in its smallest sensible vibrations 72 times that space; that is 72 + 1/4th of a line, or 4 lines, that is, 1/4 of an inch.

The latitude of the pulses of this fixed sound is 10.7 feet (4); and since the circumference of a circle is to its radius as 710 is to 113, the greatest space described by the particles will be to the radius of a circle, whose periphery is equal to the latitude of the pulse as 3/4 of an inch is to 1.7029 feet, or 20.4348 inches, that is, as 1 to 61.3044.

If the length of the string be increased or diminished in any proportion, ceteris paribus, the greatest space described by its middle point will vary in the same proportion. For the inflecting force is to the tending force as the distance of the string from the middle point of vibration to half the length of the string (see Helmham and Martin); and therefore the inflecting and tending forces being given, the string will vibrate through spaces proportional to its length; but the latitude of the pulse is inversely as the number of vibrations performed by the string in a given time, (5) that is, directly as the time of one vibration, or directly as the length of the string (prop. 24. of "Smith's Harmonics"); therefore the greatest space through which the middle point of the string vibrate, will vary in the direct ratio of the latitude of the pulse, or of the radius of a circle whose circumference is equal to the latitude, that is, it will be to that radius as 1 to 61.3044.

7. If the particles of the aerial pulses, during any part of their vibration, be successively agitated according to the law of a cycloidal pendulum, the comparative elastic forces arising from their mutual action, by which they will afterwards continue to be agitated.

In the same manner the arc of the cycloid for any given time is equal to the square of the arc, the radius of which is the distance of the point from the centre, and of which the radius is the perpendicular fall on the vertical axis; and if ES be taken equal to PL or PR, the particle E shall be found in. Thus will the particle P perform its vibrations according to the law of a cycloidal pendulum. Prop. 5b. B. 1. Principia.

Let us suppose now, that the particles have been successively agitated, according to this law, for a certain time, by any cause whatsoever, and let us examine what will be the comparative elastic forces arising from their mutual action, by which they will afterwards continue to be agitated.

Prop. 52. B. 1. Principia.

In the same manner the arc of the cycloid for any given time is equal to the square of the arc, the radius of which is the distance of the point from the centre, and of which the radius is the perpendicular fall on the vertical axis; and if ES be taken equal to PL or PR, the particle E shall be found in. Thus will the particle P perform its vibrations according to the law of a cycloidal pendulum. Prop. 5b. B. 1. Principia.

Draw the right line PS equal to EC, bisected in O, and from the centre O, with the radius OP, draw a circle, and let the whole time of the vibration of a particle and its parts be denoted by the circumference of this circle and its proportional parts. And since the particles are supposed to be at first agitated according to the law of a cycloidal pendulum, if at any time PH, or PFS, the pendicular HL or FH, be let fall on PS, and if ES be taken equal to PE or EY, the particle E shall be found in. Thus will the particle P perform its vibrations according to the law of a cycloidal pendulum. Prop. 5b. B. 1. Principia.

Draw the right line PS equal to EC, bisected in O, and from the centre O, with the radius OP, draw a circle, and let the whole time of the vibration of a particle and its parts be denoted by the circumference of this circle and its proportional parts. And since the particles are supposed to be at first agitated according to the law of a cycloidal pendulum, if at any time PH, or PFS, the pendicular HL or FH, be let fall on PS, and if ES be taken equal to PE or EY, the particle E shall be found in. Thus will the particle P perform its vibrations according to the law of a cycloidal pendulum. Prop. 5b. B. 1. Principia.
the motion of G; and that the expansion of EF in the place φ is to its mean expansion as $EF^2/F_2 = E\varepsilon$, or as $E^2+\varepsilon\varphi$ is to $EF$, or as $V+h\varepsilon$ is to $V$ in its regress, and its elastic force to the mean elastic force as $1$ is to $\varphi$; and that the difference of the elastic forces existing between $E$ and $F$, and between $F$ and $G$, is the comparative elastic force by which the physical point $φ$ is agitated: and therefore the comparative accelerating force, by which every physical point in the medium will continue to be agitated both in progress and regress, will be directly as its distance from the middle point of its vibration; and consequently, will be such as will cause the particles to continue their motion, undissipated, according to the law of a cycloidal pendulum. Prop. 38. B. I. Newton.

Newton rejects the quantity $VxIM+KN+IMxKN$ on supposition that IM and KN are indefinitely less than $V$. Now, although this may be a reasonable hypothesis, yet, that this quantity may be safely rejected, will, I think, appear in a more satisfactory manner from the following considerations derived from experiment: PS, in its greatest possible state, is to $V$ as $1$ is to $61.3044$ (6); and therefore $IM$ or $KN$, in its greatest possible state, (that is, when the vibrations of the body are as great as possible, and the particle in the middle point of its vibration) is to $V$ as one is to 122.6. Hence $V'=15030.76$; $VxIM+KN=245.2$ and $1MxKN=992$; therefore $V'$ is to $V$ as $VxIM+KN+IMxKN$ as 15.03076 to 14.73656; that is, as 61 is to 60 nearly.

Hence it appears, that the greatest possible error in the accelerating force, in the middle point, is the 1st part of the whole. In other points it is much less; and in the extreme points the error entirely vanishes.

We should also observe, that the ordinary sounds we hear are not produced by the greatest possible vibration of which the founding body is capable; and that in general IM and KN are nearly evanescent with respect to $V$. And very probably the disagreeable sensations we feel in very loud sounds, arise not only from IM or KN bearing a tolerable proportion to $V$, by which means the cycloidal law of the pulses may be in some measure disturbed, but also from the very law of the motion of the founding body itself being disturbed. For, the proof of this law's being observed by an elastic fibre is founded on the hypothesis that the space, through which it vibrates, is infinitely little with respect to the length of the string. See Smith's Harmonics, p. 237, Helff's Harmonies, p. 270.

8. If a particle of the medium be agitated, according to the law of a cycloidal pendulum, the comparative elastic force, acting on the adjacent particle, from the instant in which it begins to move, will be such as will cause it to continue its motion according to the same law.

For let us suppose, that three particles of the medium had continued to move for times denoted by the arches PK, PL, PH, the comparative elastic force, acting on the second during the time of its motion, would have been denoted by $H\varepsilon - 1M$, that is, would have been directly at $M0$ (7). And if this time be diminished till it becomes coincident with $P$, that is, if you take the particles in that state when the second is just beginning to move, and before the third particle has yet been set in motion; then the point $M$ will fall on $P$, and $MO$ become $PO$; that is, the comparative elastic force of the second particle, at the instant in which it begins to move, will be the force with which it is agitated in any other moment of time, before the subsequeint particle has yet been set in motion, directly as its distance from the middle point of vibration. Now this comparative elastic force, with which the second particle is agitated in the very moment in which it begins to move, arises from the preceding particle's approaching it according to the law of a pendulum; and therefore, if the preceding particle approaches it in this manner, the force by which it will be agitated, in the very moment it begins to move, will be exactly such as should take place in order to move it according to the law of a pendulum. It therefore sets out according to that law, and consequently the subsequeint elastic forces, generated in every successive moment, will also continue to be of the just magnitude which should take place, in order to produce such a motion.

9. The pulses of the air are propagated from founding bodies, according to the law of a cycloidal pendulum. The point $E$ of any elastic fibre proceeding a found, may be considered as a particle of air vibrating according to the law of a pendulum (1). This point $E$ will therefore move according to this law for a certain time, denoted by the arch $IH$, before the second particle begins to move; for found is propagated in time through the successive particles of air (4). Now from that instant, the comparative elastic force which agitates $P$, is (8) directly as its distance from the middle point of vibration. $F$ therefore sets out with a motion according to the law of a pendulum: and therefore the comparative elastic force by which it will be agitated until $G$ begins to move, will continue that law (8). Consequently $F$ will approach $G$ in the same manner as $E$ approached $F$, and the comparative elastic force of $G$, from the instant in which it begins to move, will be directly as its distance from the middle point of vibration; and so on in succession: Therefore all the particles of air in the pulses successively set out from their proper places according to the law of a pendulum, and therefore (7) will finish their entire vibrations according to the same law.

Cor. 1. The number of pulses propagated is the same with the number of vibrations of the tremulous body, nor is it multiplied in their progress; because the little physical line $r$, (fig. 7) as soon as it returns to its proper place, will there quiesce; for its velocity, which is denoted by the sine $IM$, then vanishes, and its density becomes the same with that of the ambient medium. This line, therefore, will no longer move, unless it be again driven forwards by the impulse of the founding body, or of the pulses propagated from it. Cor. 2. In the extreme points of the little space through which the particle vibrates, the expansion of the air is in its natural state; for the expansion of the physical line is to its natural expansion as $V+1M$ is
Propagation of Sound.

Plate III.

to V; but IM is then equal to nothing. In the middle point of the progress the condensation is greatest; for IM is then greatest; and consequently the expansion V—IM least. In the middle of the regres, the rarefaction is greatest; for IM, and consequently V+IM, is then greatest.

10. To find the velocity of the pulses, the density and elastic force of the medium being given.

This is the 46th prop. B. 2. Newton, in which he shows, that whilst a pendulum, whose length is equal to the height of the homogeneous atmosphere, vibrates once forward and backwards, the pulse will describe a space equal to the periphery of a circle described with that altitude as its radius.

Cor. 1. He thence shows, that the velocity of the pulses is equal to that which a heavy body would acquire in falling down half the altitude of that homogeneous atmosphere; and therefore, that all pulses move equally fast, whatever be the magnitude of PS, or the time of its being described; that is, whether the tone be loud or low, grave or acute. See Hales de Sonis, § 49.

Cor. 2. And also, that the velocity of the pulses is in a ratio compounded of the direct subduplicate ratio of the elastic force of the medium, and the inverse subduplicate of its density. Hence sounds move somewhat faster in summer than in winter. See Hales de Sonis, p. 141.

11. The strength of a tone is as the moment of the particles of air. The moment of these particles, (the medium being given) is as their velocity; and the velocity of these particles is as the velocity of the firing which sets them in motion (9). The velocities of two strings are equal when the spaces which they describe in their vibrations are to each other as the times of these vibrations; therefore, two different tones are of equal strength, when the spaces, through which the strings producing them vibrate, are directly as their vibration.

12. Let the strength of the tones of the two strings AB, CD, which differ in tension only (fig. 1, 2.) be equal. Quere the ratio of the inflecting forces F and f. From the hypothesis of the equality of the strength of the tones, it follows (11), that the space GE must be to the space HP as f to F. (Smith's Harm. Prop. 24. Cor. 4.) Now the forces inflecting AB, CD through the equal spaces GE, HP are to each other as the tending forces, that is, as F to f. (Malcolm's Treatise on Music, p. 52.) But the force inflecting CD through HP is to the force inflecting it through HP as HP or GE to HP, (ib. p. 47.) that is, by the hyp. as f to F. Therefore, ex aequo, the forces inflecting AB and CD, when the tones are equally strong, are to each other as F+2f to f+2F, or as F to f. That is, the forces necessary to produce tones of equal strength in various strings which differ only in tension, are to each other in the subduplicate ratio of the tending forces, that is, inversely as the time of one vibration, or directly as the number of vibrations performed in a given time. Thus, if CD be the acute octave to AB, its tending force will be quadruple that of AB, (Malcolm's Treatise on Music, p. 52) and therefore to produce tones of equal strength in these strings, the force impelling CD must be double that impelling AB: and so in other cases.

"Suppose, now, that the strings AB, CD, (fig. 4, 3.) differ in length only. The force inflecting AB through GE is to the tending force, which is given, as GE to AG; and this tending force is to the force inflecting CD through the space HP equal to GE, as HD to HP. Therefore, ex aequo, the forces inflecting AB and CD through the equal spaces GE and HP, are to each other as HD to AG, or as CD to AB. But the force inflecting CD through HP is to the force inflecting it through HP, as HP or GE to HP, that is, because these spaces are as the times (11), as AB to CD. Therefore, ex aequo, the forces inflecting AB and CD, when the tones are equally strong, are to each other in a ratio of equality. Hence we should suppose, that in this case, an equal number of equal impulses would generate equally powerful tones in these strings. But we are to observe, that the longer the string, the greater, ceteris paribus, is the space through which a given force inflects it (Malcolm); and therefore whatever diminution is produced in the spaces thro' which the strings move in their successive vibrations, arising either from the want of perfect elasticity in the strings or from the resiliency of the air, this diminution will bear a greater proportion to the left space, through which the shorter string vibrates. And this is confirmed by experience; for we find that the duration of the tone and motion of the whole string exceeds that of any of its subordinate parts. Therefore, after a given interval of time, a greater quantity of motion will remain in the longer string; and consequently, after the successive equal impulses have been made, a greater degree of motion will fall unfinished in it. That is, a given number of equal impulses being made on various strings differing in length only, a stronger sound will be produced in that which is the longer."

Chap. III. Of the Velocity, &c. of Sound. Anomis.

Experience has taught us, that sound travels at about Velocity of the rate of 1142 feet in a second, or near 13 miles in a found minute; nor do any obstacles hinder its progress, contrary wind only a small matter diminishing its velocity. The method of calculating its progress is easily made known. When a gun is discharged at a distance, we see the fire long before we hear the sound. If then we know the distance of the place, and know the time of the interval between our first seeing the fire and then hearing the report, this will show us exactly the time calculated. The sound has been travelling to us. For instance, if the gun is discharged a mile off, the moment the flash is seen, you take a watch and count the seconds till you hear the sound; the number of seconds is the time the sound has been travelling a mile. Again, by the above axiom, we are enabled to find the distance between objects that would be otherwise immeasurable. For ex: Distautes ample, suppose you see the flash of a gun in the night as calculated sea, and tell seven seconds before you hear the report, by means it follows therefore, that the distance is seven times of sound. 1142 feet, that is, 24 yards more than a mile and a half. In like manner, if you observe the number of seconds between the lightning and the report of the thunder, you know the distance of the cloud from whence it proceeds.

Derham has proved by experience, that all sounds all sounds whatever travel at the same rate. The sound of a gun, travels the same rate.
and the striking of a hammer, are equally swift in their motions: the softest whisper flies as swiftly, as far as it goes, as the loudest thunder.

To these axioms we may add the following. Smooth and clear sounds proceed from bodies that are homogeneous, and of a uniform figure; and harsh or obtuse sounds, from such as are of a mixed matter and irregular figure.

The velocity of sound is to that of a brisk wind as fifty to one.

The strength of sounds is greatest in cold and dense air, and least in that which is warm and rarefied.

Every point against which the pulses of sound strike, become a centre from which a new series of pulses are propagated in every direction.

Sound describes equal spaces in equal times.

**Chap. IV. Of Reverberated Sounds.**

Sound, like light, after it has been reflected from several places may be collected in one point, as into a focus; and it will be there more audible than in any other part, even than at the place from whence it proceeded. On this principle it is that a whispering gallery is constructed.

The form of this gallery must be that of a concave hemisphere (a), as ABC; and if a low sound or whisper be uttered at A, the vibrations expanding themselves every way will impinge on the points DDD, &c. and from thence be reflected to EEE, and from thence to the points F and G, till at last they all meet in C, where, as we have said, the sound will be the most distinctly heard.

The augmentation of sound by means of speaking-trumpets, is usually illustrated in the following manner: Let ABC be the tube, BD the axis, and B the mouth-piece for conveying the voice to the tube. Then it is evident, when a person speaks at B, without the tube, will have the force of his voice spent in exciting concentric superficies of air all around the point B; and when those superficies or pulses of air are diffused as far as D every way, it is plain the force of the voice will there be diffused through the whole superficies of a sphere whose radius is BD; but in the trumpet it will be so confined, that at its exit it will be diffused through so much of that spherical surface of air as corresponds to the orifice of the tube. But since the force is given, its intensity will be always inversely as the number of particles it has to move; and therefore in the tube it will be to that without, as the superficies of such a sphere to the area of the large end of the tube nearly.

But it is obvious, Mr Young observes, that the confinement of the voice can have little effect in increasing the strength of the sound, as this strength depend on the velocity with which the particles move. Were this reasoning conclusive, the sound should issue through the smallest possible orifice; cylindrical tubes would be preferable to any that increased in diameter; and the less the diameter, the greater would be the effect of the instrument; because the plate or mass of air to be moved, would, in that case, be less, and consequently the effect of the voice the greater; all which is contradicted by experience.

The cause of the increase of sound in these tubes must therefore be derived from some other principles: and amongst these we shall probably find, that what the ingenious Kircher has suggested in his Phaenomina is the most deserving of our attention. He tells us, if the augmentation of the sound depends on its reflection from the tremulous sides of the tube; which reflections, conspiring in propagating the pulses in the same direction, must increase its intensity. Newton also seems to have considered this as a principal cause, in the scholium of prop. 50. B. 2. Princip. when he says, "we hence see why sounds are so much increased in flentorophonic tubes, for every reciprocal motion is, in each return, increased by the generating cause."

Further, when we speak in the open air, the effect on the tympanum of a distant auditor is produced merely by a single pulse. But when we use a tube, all the pulses propagated from the mouth, except those in the direction of the axis, strike against the sides of the tube, and every point of impulse becoming a new centre, from whence the pulses are propagated in all directions, a pulse will arrive at the ear from each of those points; thus, by the use of a tube, a greater number of pulses are propagated to the ear, and consequently the sound increased. The confinement too of the voice may have some effect, though not such as is ascribed to it by some; for the confined pulses produced by the naked voice, freely expand every way; but in tubes, the lateral expansion being diminished, the direct expansion will be increased, and consequently the velocity of the particles, and the intensity of the sound. The sub stance also of the tube has its effect; for it is found by experiment, that the more elastic the substance of the tube, and consequent ly the more susceptible it is of those tremulous motions, the stronger is the sound.

If the tube be laid on any non-elastic substance, it de celerates the sound, because it prevents the vibratory motion of the parts. The sound is increased in speaking trumpets, if the tube be suspended in the air; because the agitations are then carried on without interruption. These tubes should increase in diameter from the mouth piece, because the parts, vibrating in directions perpendicular to the surface, will confpire in impelling forward the particles of air, and consequently, by increasing their velocity, will increase the intensity of the sound: and the surface also increasing, the number of points of impulse and of new propagations will increase.

(e) A cylindric or elliptic arch will answer still better than one that is circular.
As echo is a reflection of sound striking against some object, as an image is reflected in a glass: but it has been disputed what are the proper qualities in a body for thus reflecting sounds. It is in general known, that caverns, grottoes, mountains, and ruined buildings, return this image of found. We have heard of a very extraordinary echo, at a ruined fortrefs near Louvain, in Flanders. If you enter the cave, and continue your voice for some time, you will hear a reflection of your voice at a distance of 127 feet or more, and no other sound will be heard at the same instant. Thus a person, who has entered the cave, may hear his own voice after a second or a third echo, though the echo which the voice of another produces, will return it at the rate of 9 or 10 times a second.

As (by n° 21 and 22) every point against which the pulses of sounds strike becomes the centre of a new series of pulses, and sound describes equal distances in equal times; therefore, when any found is propagated from a centre, and its pulses strike a variety of obstacles, if the sum of the right lines drawn from that point to each of the obstacles, and from each obstacle to a second point, be equal, then will the latter be a point in which an echo will be heard. Thus let A be the point from which the sound is propagated in all directions, and let the pulses strike against the obstacles C, D, E, F, G, H, I, &c. each of these points becomes a new centre of pulses by the first principle, and therefore from each of them one series of pulses will pass through the point B. Now if the several sums of the right lines AC+CB, AD+DB, AE+EB, AG+GB, AH+HB, AI+IB, &c. be all equal to each other, it is obvious that the pulses propagated from A to these points, and again from these points to B, will all arrive at B at the same instant, according to the second principle; and therefore, if the hearer be in that point, his ear will at the same instant be struck by all these pulses. Now it appears from experiment (see Maffchenbroek, V. ii. p. 210), that the ear of an exercised musician can only distinguish such sounds as follow one another at the rate of 9 or 10 in a second, or any slower rate: and therefore, for a distinct perception of the direct and reflected sound, there should intervene the interval of 4th of a second; but in this time sound describes 222 or 127 feet nearly. And therefore, unless the sum of the lines drawn from each of the obstacles to the points A and B exceed the interval AB by 127 feet, no echo will be heard at B. Since the several sums of the lines drawn from the obstacle to the points A and B are of the same magnitude, it appears that the curve passing through all the points C, D, E, F, G, H, I, &c. will be an ellipse. (prop. 4. B. 2. Ham. Cons.) Hence all the points of the obstacles which produce an echo, must lie in the surface of the oblong spheroid, generated by the revolution of the ellipse round its major axis.

As there may be several spheroids of different magnitudes, so there may be several different echoes of the same original found. And as there may happen to be a greater number of reflecting points in the surface of an exterior spheroid than in that of an interior, a second or a third echo may be much more powerful than the first, provided that the superior number of reflecting points, that is, the superior number of reflected pulses propagated to the ear, be more than sufficient to compensate for the decay of found which arises from its being propagated through a greater space. This is finely illustrated in the celebrated echoes at the lake of Killarney in Kerry, where the first return of the found is much inferior in strength to those which immediately succeed it.

From what has been laid down it appears, that for the most powerful echo, the founding body should be in one focus of the ellipse which is the section of the echoing spheroid, and the hearer in the other. However, an echo may be heard in other situations, though not so favourably; as such a number of reflected pulses may arrive at the same time at the ear as may be sufficient to excite a distinct perception. Thus a person often hears the echo of his own voice; but for this purpose he should stand at least 6 or 64 feet from the reflecting obstacle, according to what has been said before. At the common rate of speaking, we pronounce not above three syllables and a half, that is, seven half syllables in a second; therefore, that the echo may return just as soon as three syllables are expressed, twice the distance of the speaker from the reflecting object must be equal to 1000 feet; for, as found describes 1142 feet in a second, this of that space, that is, 1000 feet nearly, will be described while fix half or three whole syllables are pronounced: that is, the speaker must stand near 500 feet from the obstacle. And in general, the distance of the speaker from the echoing surface, for any number of syllables, must be equal to the seventh part of the product of 1142 feet multiplied by that number.

In churches we never hear a distinct echo of the voice, but a confused sound when the speaker utters his words too rapidly; because the greatest difference of distance between the direct and reflected courses of such a number of pulses as would produce a distinct found, is never in any church equal to 127 feet, the limit of echoes.

But though the first reflected pulses may produce no echo, both on account of their being too few in number, and too rapid in their return to the ear; yet it is evident, that the reflecting surface may be so formed, that the pulses which come to the ear after two reflections or more may, after having described 127 feet or more, arrive at the ear in sufficient numbers, and also so nearly at the same instant, as to produce an echo, though the distance of the reflecting surface from the ear be less than the limit of echoes. This is confirmed by a singular echo in a grotto on the banks of the little brook called the Dianan, about two miles from Castlecomer, in the county of Kilkenny. As you enter the cave, and continue speaking loud, no return of the voice is perceived: but on your arriving at
Chap. IV.  

ACoustics.

Entertaining Experiments and Conver-  

ting Experiments,  

1. Place a concave mirror of about two feet diameter, as AB (c), in a perpendicular direction. The focus of this mirror may be at 15 or 18 inches distance from its surface. At the distance of about five or six feet let there be a partition, in which there is an opening EF, equal to the size of the mirror; against this opening must be placed a picture, painted in water-colours, on a thin cloth, that the sound may easily pass through it (H).

Behind the partition, at the distance of two or three feet, place another mirror GH, of the same size as the former, and let it be diametrically opposite to it.

At the point C let there be placed the figure of a man seated on a pedestal, and let his ear be placed exactly in the focus of the first mirror; his lower jaw must be made to open by a wire, and shut by a spring; and there may be another wire to move the eyes; these wires must pass through the figure, go under the floor, and come up behind the partition.

Let a person, properly instructed, be placed behind the partition near the mirror. You then propose to any one to speak softly to the statue, by putting his mouth to the ear of it, affuring him that it will answer instantly. You then give the signal to the person behind the partition, who, by placing his ear to the focus I, of the mirror GH, will hear distinctly what the other said; and, moving the jaw and eyes of the statue by the wires, will return an answer directly, which will in like manner be distinctly heard by the first speaker.

This experiment appears to be taken from the Century of Inventions of the Marquis of Worcester; whose designs, at the time they were published, were treated with ridicule and neglect as being impracticable, but are now known to be generally, if not universally practicable. The words of the Marquis are these:—"How to make a bronz or stone head in the midst of a great field or garden, so artificial and natural, that though a man speak ever so softly, and even whisper into the ear thereof, it will pretend to answer the inquiry, whether in French, Latin, Greek, Irish, or English in good terms, uttering it out of its mouth, and then shut it until the next question be asked."—The two following, of a similar nature, appear to have been inventions of Kircher, by means of which (as he informs us*) he used to "utter designed and ingenious confutations, with a view to give Nov., 1701, open the fallacy and impotence of ancient oracles."

II. Let there be two heads of plaster of Paris, placed on pedestals, on the opposite sides of a room. Here the commode must be a tube of an inch diameter, that must pass through the head of one, and be placed in the other; and at the middle of the chamber, between the heads, will not hear any part of their conversation.

III. Place a bust on a pedestal in the corner of a room, and let there be two tubes, as in the foregoing case. One of which must go from the mouth of the bust, and the other from the ear of the bust, through the pedestal, and the floor, to an under apartment. There may be likewise wires that go from the under jaw and the eyes of the bust, by which they may be easily moved.

A person being placed in the under room, and at a signal given applying his ear to one of the tubes, will hear any question that is asked, and immediately reply; moving at the same time, by means of the wires, the mouth and the eyes of the bust, as if the reply came from it.

IV. In a large room, such as is used for dial and spring A Solar clocks, the front of which, or at least the lower part of it, must be of glass, covered with the inside with guaze, but there must be placed a barrel organ, which, when wound up, is prevented from playing, by a catch that takes a toothed wheel at the end of the barrel. To one end of this catch must be joined a wire, at the end of which there is a flat circle of cork, of the same dimension with the inside of a glass tube, in which it is to rise and fall. This tube must communicate with a reservoir that goes across the front part of the bottom of the room, which is to be filled with spirits, such as is used in their

(c) Both the mirrors here used may be of tin or gilt pasteboard, this experiment not requiring such as are very accurate.

(H) The more effectually to conceal the cause of this allusion, the mirror AB may be fixed in the window, and a guaze or any other thin covering thrown over it, as that will not in the least prevent the sound from being reflected. An experiment of this kind may be performed in a field or garden, between two hedges, in one of which the mirror AB may be placed, and in the other an opening artfully contrived.
thermometers, but not coloured, that it may be the better concealed by the gauze.

This case being placed in the fun, the spirits will be rared by the heat; and rising in the tube, will lift up the catch or trigger, and let the organ in play: which it will continue to do as long as it is kept in the fun; for the spirits cannot run out of the tube, that likely be more complex, but could scarce answer the calls.

When the machine is placed against the side of a room on which the fun shines strong, it may constantly remain in the same place, if you inclose it in a second case, made of thick wood, and placed at a little distance from the other. When you want it to perform, it will be only necessary to throw open the door of the outer case, and expose it to the fun.

But if the machine be movable, it will perform in all seasons by being placed before the fire; and in the winter it will more readily fill when removed into the cold.

A machine of this sort is said to have been invented by Cornelius Dreble, in the last century. What the construction of that was, we know not; it might very likely be more complex, but could scarce answer the intention more readily.

V. UNDER the keys of a common harpichord let there be fixed a barrel, something like that in a chamber organ, with stops or pins corresponding to the tunes you would have it play. These stops must be moveable, so that the tunes may be varied at pleasure. From each of the keys let there go a wire perpendicular down: the ends of these wires must be turned up for about one-fourth of an inch. Behind these wires let there be an iron bar, to prevent them from going too far back. Now, as the barrel turns round, its pins take the ends of the wires, which pull down the keys, and play the harpichord. The barrel and wires are to be all inclosed in a case.

In the chimney of the same room where the harpichord stands, or at least in one adjacent, there must be a smoke jack, from whence comes down a wire, or cord, that, passing behind the wainscot adjoining the chimney, goes under the floor, and up one of the legs of the harpichord, into the case, and round a small ing experiment wheel fixed on the axis of that first mentioned. There should be pulleys at different distances, behind the wainscot and under the floor, to facilitate the motion of the chord.

This machinery may be applied to any other keyed instrument as well as to chimes, and to many other purposes where a regular continued motion is required.

An instrument of this sort may be considered as a perpetual motion, according to the vulgar acceptance of the term; for it will never cease going till the fire be extinguished, or some parts of the machinery be worn out.

VI. At the top of a summer-house, or other building, a Ventofal may be the wind-wheel B (of which A is an horizontal Symphony, section,) be on the upper end of the perpendicular axis F; on the lower end of which is fixed the pin on C that takes the toothed wheel D on the axis of the great wheel E. The perpendicular axis F goes down very near the wall of the room, and may be covered after the same manner as are bell-wires.

In the great wheel there must be placed a number of stops, corresponding to the tunes it is to play. These stops are to be moveable, that the tunes may be altered at pleasure. Against this wheel there must hang 12 small bells, answering to the notes of the gamut. Therefore, as the wheel turns round, the stops striking against the bells, play the several tunes. There should be a fly to the great wheel, to regulate its motion when the wind is strong. The wheel E, and the bells, are to be inclosed in a case.

There may be several sets of bells, one of which may answer to the tenor, another to the treble, and a third to the bass; or they may play different tunes, according to the size of the wheel. As the bells are small, if they are of silver, their tone will be the more pleasing.

Instead of bells, glasses may be here used, so disposed as to move freely at the stroke of the stops. This machinery may likewise be applied to a barrel-organ, and to many other uses.

ACQ., a town at the foot of the Pyrenean mountains, in the government of Foix in France. It takes its name from the hot waters in these parts. E. long. 1. 40. lat. 43. 0.

ACQUAPENDENTE, a pretty large town of Italy, in the territory of the church, and patrimony of St Peter, with a bishop's see. It is seated on a mountain, near the river Paglia, ten miles W. of Orvieto, and 57 N. by W. of Rome. E. long. 11. 53. Lat. 42. 43.

ACQUARIA, a small town of Italy, in Frigana, a district of Modena, which is remarkable for its medicinal waters. It is 12 miles south of the city of Modena. E. long. 11. 17. lat. 44. 24.

ACQUEST, or ACQUIST, in law, signifies goods got by purchase or donation. See Conquest.

ACQUI, a town of Italy, in the duchy of Monteferrat, with a bishop's see, and commodious baths. It was taken by the Spaniards in 1745, and retaken by the Piedmontese in 1746; but after this, it was taken again and dismantled by the French, who afterwards fortook it. It is seated on the river Bormis, 23 miles N. W. of Genoa, and 30 S. of Casal. E. long. B. 30. Lat. 44. 40.

ACQUISITION, in general, denotes the obtaining or procuring something. Among lawyers, it is used for the right or title to an estate got by purchase or donation.

ACQUITTAL, a discharge, deliverance, or freeing of a per son free from the guilt or suspicion of an offence.

ACQUITTANCE, a release or discharge in writing for a sum of money, witnessing that the party has paid the said sum. No man is obliged to pay a sum of
money if the demandant refuses to give an acquittance, which is a full discharge, and bars all actions, &c. An acquittance given by a servant for a sum of money received for the use of his master, shall be a good discharge for that sum, provided the servant used to receive his master's rents, debts, &c.

ACRA, a town of Africa, on the coast of Guinea, where the English, Dutch, and Danes, have strong forts, and each for its particular village. W. Long. 0. 2. Lat. 5. 0.

ACRA, one of the hills of Jerusalem, on which stood the town of Jerusalem, and was afterwards named Zion, or the city of David. Probably called Acre, from the fortresses which Antiochus built there in order to annoy the temple, and which Simon Maccabeus took and razed to the ground.

ACRA Tappia, called Selentia by Ptolemy; now Cape of San Maria de Leuca. A promontory in the kingdom of Naples, to the south-east of Otranto, where formerly was a town, now lying in ruins, on the Ionian sea, over against the Montes Acroceraunii of Epirus.

ACRA, a town of Sicily, where the inhabitants are called Acerani. They were called the Acreans, and their town, Acras, had for its boundary the river Acra, now called Fiume di Gergenti, near the port of Trapani, where formerly was a town, now called配有 the same name. The town was famous for the Phalarides, and his brazen bull. They were a people luxurious in their tables, and magnificent in their dwellings; of whom Empedocles, in Diogenes Laertius, says, that they lived to-day as if they were to die to-morrow, and built as if they were to live forever. The country round the city was laid out in vine and olive yards, in the produce of which they carried on a great and profitable commerce with Carthage. E. Long. 13. 30. Lat. 37. 20.

ACRASIA, among physicians, implies the predominancy of one quality above another, either with regard to artificial mixtures, or the humours of the human body. The word is Greek, and compounded of 

ACRATH, a place in Mauritania Tingitana, now supposed to be Felez de Gomara. A fortified town in the kingdom of Fez, with a capital and commodious harbour on the Mediterranean, scarce a league distant from Penon de Velez, a Spanish fort. W. Long. 5. Lat. 34. 45.

ACRE, or Acre, a sea-port town in Syria. It was formerly called Ptolemais, and is a bishop's see. It was very famous in the time of the crusaders, and underwent several sieges both by the Christians and Saracens. It is situated at the north angle of a bay, which extends in a semicircle of three leagues, as far as the point of Carmel.

During the Crusades, the possession of this town was long disputed by the Christians and Saracens. In 1192 it was taken from the latter by Richard I. of England and Philip of France, who gave it to the knights of St John of Jerusalem, who kept possession of it 100 years, when it was retaken by the Saracens, and almost entirely destroyed. This event is rendered memorable by an act of singular resolution with which it was accompanied. A number of beautiful young nuns, terrified at the prospect of being exposed to the brutal lust of the infidels, determined to avoid the violation of their chastity, by rendering themselves objects of aversion. With this view they cut off their noyes and mangled their faces. The Saracens, inflamed with resentment at such a spectacle which prevented the gratification of their appetites, immediately put them all to the sword. After the expulsion of the crusaders, it remained almost deserted, but in our time has again revived by the industry of Daher; and the works erected by Djezzar, within the last ten years, have rendered it one of the principal towns upon the coast. The mosque of this Pacha is boasted as a masterpiece of eastern taste. The bazaar, or covered market, is not inferior even to those of Aleppo, and its public fountain surpasses in elegance those of Damascus, though the water is of a very indifferent quality. The Pacha has derived the more honour from these works, as he was himself both the engineer and architect: he formed the plans, drew the designs, and superintended the execution.

The port of Acre is one of the best situated on the coast, as it is sheltered from the north and north-west winds by the town itself; but it is greatly spoiled since the time of Fakr-el-din. Djezzar has contented himself with making a landing-place for boats. The fortifications, though more frequently repaired than any other in all Syria, are of no importance: there are only a few wretched low towers, near the port, on which cannon are mounted; and the rusty iron pieces are so bad, that some of them burst every time they are fired. Its defence on the land side is merely a garden-wall, without any ditch.

Corn and cotton form the basis of the commerce of Acre, which is becoming more flourishing every day. Of late, the Pacha, by an abuse common throughout all the Turkish empire, has monopolized all the trade in his own hands; no cotton can be sold but to him, and from him every purchase must be made. In vain have the European merchants claimed the privileges granted
granted them by the Sultan; Djezzar replied, that he was the Sultan in his country, and continued his monopoly. Theb's merchants in general are French, and have six houses at Acre, with a consul; an imperial agent too is lately settled there; also a resident for Ruffia.

That part of the bay of Acre, in which ships anchor with the greatest security lies to the north of Mount Carmel, below the village of Haifa (commonly called Callifa). The bottom is good holding ground, and does not chafe the boats; but the harbour is open to the north-west wind, which blows violently along open fields, about half a square mile, thickly studded with brambles' wild vines and olive trees, which prove that the ancient Israelites called this place Mount Carmel, because the prophet Elias, which affords an extensive plain, is said to have divided the cart into 39.25 acres; the pound (or rupee) is of the value of the French crown in Indostan, or about 16 French c partitions of land, but any open ground, especially the waste lands, is open on lands of the deferts, and to have fed on locusts. Their food was extremely miserable; for in their houses, where they were meagre, and extremely black. In the spring, high wind could not keep the locusts from destroying their crops. The smoke which arose from this immense fire was so thick, that the sky was filled with it, and fell in heaps on the ground. The passage of the locusts being thus intercepted for many days, they made a large provision of locusts and other insects. As their country produced great quantities of salt, they salted them, to render them more palatable, and to make them keep till the next season. This peculiar supply was their sole food: they had neither herds nor flocks. They were unacquainted with fishing; for they lived at a distance from the sea. They were very active, and ran with great swiftness. Their life was not of long duration; it exceeded not forty years. The close of their life was extremely miserable; for in their old age, they were feeble, and their eyesight failed; and in their bodies. This malady, which began in the breast and ended in the heart, was so violent that it was not possible to bear it. For when those lice, which had bred in their heart, forced their way out, they caused effusions of corrup blood, with exccruting pains in the skin. The unhappy man, with lamentable cries, was indwelling himself to make off those for them with his nails. In short, these lice rushed forth successively from the wounds made by the hands of the combatants, between the frontiers of their kingdoms, with sword and lance; it was also called cake of the field being the stage of trial. Acre-Tax, a tax laid on land at $1,000 per acre. In some places this is also called acre-fold. Impostions on lands in the great level are to be raised by a proportionable acre-tax, 20 Car. ii. cap. 8. — An acre-tax of 25 sh. per acre, for draining Hadenden-level, 13 Geo. i. cap. 18.

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hands of the patient, as from a vessel full of holes, and in such numbers that it was impossible to exterminate them. Whether this extraordinary and dreadful distemper was occasioned by the food of the inhabitants of this country, or by a pestilential quality of their climate, it is difficult to determine. Indeed, as to the credibility of the whole account, we must leave the reader to judge.

But though the circumstances of these people should be deemed fabulous, yet may the acridophagia be true. It is well known, that to this day the inhabitants of Ethiopia, Arabia, &c. frequently use locusts as food. The reader will not be displeased if we lay before him the result of Dr Hallequin’s inquiries as to this particular, who travelled in Syria and Egypt so late as the year 1752. This ingenious gentleman, who travelled with a view to improve natural history, informs us, that he asked Franks, and many other people who had lived long in these countries, whether they had ever heard that the inhabitants of Arabia, Ethiopia, &c. used locusts as food. They answered that they had. He likewise asked the same question of Armenians, Copts, and Syrians, who lived in Arabia, and had travelled in Syria and near the Red Sea; some of whom said they heard of such a practice, and others that they had often seen the people eat these insects. He at last obtained complete satisfaction on this head from a learned cheek at Cairo, who had lived six years in Mecca. This gentleman told him, in presence of M. le Grand the principal French interpreter at Cairo, and others, that a famine frequently rages at Mecca when there is a scarcity of corn in Egypt, which obliges the inhabitants to live upon coarser food than ordinary. That when corn is scarce, the Arabs grind the locusts in hand-mills, or stone-mortars, and bake them into cakes, and use these cakes in place of bread: That he has frequently seen locusts used by the Arabs, even when there was no scarcity of corn; but then they boil them, chew them with butter, and make them into a kind of frieace; which he says is not disagreeably tasted, for he had sometimes tasted these locusts themselves out of curiosity.

A later traveller, Dr Spartman, informs us, that locusts sometimes afford a high treat to the inhabitants, more unpolluted and remote hordes of the Hottentots; when, as sometimes happens, after an interval of 8, 10, 15, or 20 years, they make their appearance in incredible numbers. At these times they come from the north, migrating to the southward, and do not suffer themselves to be impeded by any obstacles, but fly boldly on, and are drowned in the sea whenever they come to it. The females of this race of insects, which are most apt to migrate, and are chiefly eaten, are not said to be able to fly; partly by reason of the shortness of their wings, and partly on account of their being heavy and distended with eggs; and shortly after they have laid these in the sand, they are said to die. It is particularly of these that the Hottentots make a brown coffee-coloured soup, which, at the same time, acquires from the eggs a fat and greasy appearance. The Hottentots are highly rejoiced at the arrival of these locusts, though they are sure to destroy every bit of verdure on the ground: but the Hottentots make themselves ample amends for this loss, by falling foul on the animals themselves, eating them in such quantities as in the space of a few days to get visibly fatter and in better condition than before.

The abbé Poiret, also, in his Memoir on the Insects of Barbary and Numidia, informs us, “That the Moors make locusts a part of their food; that they go to hunt them; fry them in oil and butter; and sell them publicly at Tunis, at Bonne.”

From these accounts, we may see the folly of that dispute among divines about the nature of St John’s food in the wilderness: some maintaining the original word to signify the fruits of certain trees; others, a kind of birds, &c.: but those who adhered to the literal meaning of the text were at least the most orthodox, although their arguments were perhaps not so strong as they might have been, had they had an opportunity of quoting such authors as the above.

ACRISIUS, king of Argos (Fab. hist.), being told by the oracle that he should be killed by his grandchild, that up his only daughter Danae in a brazen tower: but Jupiter coming down in a golden flower, beget Perseus upon her: after Perseus had slain the Gorgons, he carried Medusa’s head to Argos; which Acritis seeing, was turned into a flute.

ACRITAS (anc. geog.), a promontory of Messenia, running into the sea, and forming the beginning of the bay of Melfene. Now called Capo di Catto, between Methone to the west, and Corone to the east, where the Sinus Coronensis begins.

ACROAMATIC, or ACROATIC, in general, denotes a thing sublime, profound, or abstruse.

ACROSTIC; a denomination given the discipulæ or followers of Aristotle, &c. who were admitted into the secrets of the inner or acroatic philosophy.

ACROATIC. Aristotles lectures to his discipulæ were of two kinds, exoteric and acroatic. The acroatic were those to which only his own disciples and intimate friends were admitted; whereas the exoteric were public, and open to all. But there are other differences. The acroatic were kept apart for the higher and more abstruse subjects; the exoteric were employed in rhetorical and civil speculations. Again, the acroatics were more subtle and exact, evidence and demonstration being here aimed at; the exoterics chiefly aimed at the probable and plausible. The former were the subjects of the mornings exercises in the Lyceum, and the latter of the evenings. Add, that the exoterics were published: whereas the acroatics were kept secret; being either entirely concealed; or, if they were published, it was in such obscure terms, that few but his own disciples could be the wiser for them. Hence, when Alexander complained of his preceptor for publishing his acroatics, and thus revealing what should have been reserved to his disciples, Aristotle answered that they were made public and not public; for that none who had not heard them explained by the author sicut voca, would understand them.

ACROATHOUM, or ACROTHOUM (anc. geog.), a town situated on the top of mount Athos, where the inhabitants, according to Mela, were longer lived by half than in any other country: called by the modern Greeks, Αγρακτοι by the Italians, La Cima di Monte Santo.

ACROBATIC, or ACROBATICUM, from ακροβατικός, akrobatisikos, high, and πατω, or πατο I go; an ancient engine, whereby
whereby people were raised aloft, that they might see more conveniently about them. The **acrobatia** among the Greeks amounted to the fame with what they call **scanatorium** among the Latins. Authors are divided as to the office of this engine. Turmescus and Barbara take it to have been of the military kind, raised by besiegers, high enough to overlook the walls, and to discover the state of things on the other side. Baldus rather supposes it a kind of moveable scaffold, or cradle, contrived for raising painters, plasterers, and other workmen, to the tops of houses, trees, &c. Some suspect that it might have been used for both purposes; which is the opinion of Vitruvius and Aquinas.

**ACROCERANIA**, or **Montes Ceranii** (anc. geog.), mountains running out into the sea (to called from their being often thunderstruck), separating the Ionian sea from the Adriatic; which is the opinion of Vitruvius and Aquinas.

**ACROCHERISMUS**, among the Greeks, a fort of gymnastic exercise, in which the two combatants contended with their hands and fingers only, without closing or engaging the other parts of the body.

**ACROCORINTHUS** (anc. geog.), a high and steep hill, hanging over the city of Corinth, which was taken within the walls, as an acropolis, or citadel. On its top stood a temple of Venus; and lower down issued the fountain Pyrene.

**ACROMION**, in anatomy, the upper part of the scapula or shoulder-blade. See Anatomy.

**ACROMONOGRAMMATICUM**, in poetry, a kind of poem, wherein every subsequent verse begins with the letter where with the immediately preceding one terminated.

**ACRON**, a celebrated physician of Agrigentum, who first thought of lighting large fires, and purifying the air with perfumes, to put a spell on the pestilence that ravaged Athens, and which was attended with success. He lived about 473 years before the Christian era.

**ACRON**, a territory on the gold-coast of Guinea, in Africa, bordering on the Fannyan country. The Dutch have a fort here called Fort Patience; and under it is a village, inhabited only by fishermen. The other inhabitants are addicted to bushbandy, and fell their corn to other countries. There is plenty of game, which is very commodious for the Dutch factory. The people are very ignorant, and go naked like the rest of the negroes. This is called Little Acron; for Great Acron is farther inland, and is a kind of a republic.

**ACRONICAL**, **ACRONYCHAL**, or **ACRONICAL**, in astronomy, is a term applied to the rising of a star, when the sun is set in the evening; but has been promiscuously used to express a star's rising at sunrise, or setting at sunset.

**ACRONIUS LACUS** (Mela); a small lake formed by the Rhine, soon after its rise out of the Alps, and after passing the greater lake at Constance, called Venetia, and now the Bodensee, or lake of Constance.

**ACROPOLIS** (anc. geog.), the citadel, and one of the divisions of Athens; called Polis, because constituting the first and original city; and the Upper Polis, to distinguish it from the Lower, which was afterwards built round it in a large open plain, the Acropolis standing on a rock or eminence in the heart of this plain; and hence its name: To the north it had a wall, built by the Pelagii, and therefore called Pelagia; and to the south a wall, by Cymon the son of Miltiades, out of the Persian ipolis, many ages after the building of the north wall. It had nine gates, and was therefore called Enneastyle; yet but one principal gate or entrance, the ascent to which was by a flight of steps of white marble, built by Pericles with great magnificence, (Plutarch).

**ACROPOLITA** (George), one of the writers in the Byzantine history, was born at Constantine, in the year 1220, and brought up at the court of the emperor John Ducas at Nice. He was employed in the most important affairs of the empire; being sent ambassador to Larissa, to establish a peace with Michael of Epirus; and was confulated judge to try Michael Comnenus, suspected of engaging in a conspiracy. Theodosius Laercius, the son of John, whom he had taught logic, appointed him governor of all the western provinces in his empire. In 1225, he was taken prisoner in a war with Michael Angelus: but gaining his liberty in 1260, by means of the emperor Palæologus, he was sent by him ambassador to Constance, prince of Bulgaria; and was employed in several other negotiations. He wrote, A Continuation of the Greek History, from the taking of Constantinople by the Latins till it was recovered by Michael Palæologus in 1261, which makes part of the Byzantine history; A Treatise concerning Faith, Virtue, and the Soul; An Epistle of the Sermons of St Gregory Nazianzen and other pieces. Gregory Cyprian, patriarch of Constantinople, in his eulogium upon him, prefixed to Acropolita's history, is perhaps somewhat extravagant in his praise, when he says he was equal to Aritotele in philosophy, and to Plato in the knowledge of divine things and Attic eloquence.

**ACROSPIRE**, a vulgar term for what botanists call the **plume**. See the article Plantes.

**ACROSPURED**, in malt-making, is the grain's floating both at the root and blade end.

**ACROSTIC**, in poetry, a kind of poetical composition, disposed in such a manner, that the initials of the verses form the name of some person, kingdom, place, motto, &c. The word is compounded of the Greek, **ακρις**, **επιτραμμενη**, and **στροφη**. The acrostic is considered by the critics as a species of false wit, and is therefore very little regarded by the moderns.

**ACROSTICUM**, **RUSTICUM**, **WALL-RUE**, or **FORK-FERN**, in botany, a genus of the cryptogamia filices. The fructifications are accumulated on the whole inferior surface of the frond, so that they everywhere cover it. There are upwards of 30 species; but only three of them (according to others, two) are natives of Britain, viz. the septentrionale, or horned fern, which grows on walls or cliffs of rocks; the ilvensis, or hairy fern, growing in cliffs of rocks; and the thelypris, or marsh fern, in tusby bogs.

**ACROSTOLIUM**, in ancient naval architecture, the extreme part of the ornament used on the prows of their ships, which was sometimes in the shape of a backler, helmet, animal, &c.; but more frequently circular, or spiral. It was usual to tear them from the prows of vanquished vessels, and fix them to the conquerors, as a signal of victory.

ACRO-
ACROTELEPTIC, among ecclesiastical writers, an appellation given to any thing added to the end of a plain; as the Gloria Patri, or Doxology.

ACROTERIA, in architecture, small pedestals, usually without bases, placed either at the middle or two extremities of the pediments or frontispieces, serving to support the statues, &c. It also signifies the figures placed as ornaments on the tops of churches, and the sharp pinacles that stand ranges about flat buildings with rails and balusters.

Among ancient physicians, it signifies the larger extremities of the body, as the head, hands, and feet. It has also been used for the tips of the fingers, and sometimes for the eminences or processes of bones.

ACROTHYMION, from ακρό, extreme, and τυμη, thyme. A fort of wart described by Celsus as hard, rough, with a narrow basis and broad top; the top is of the colour of thyme, it easily splits and bleeds. This tumour is also called thymus.

ACT, in general, denotes the exertion of power; and differs from power, as the effect from the cause.

ACT, in logic, is particularly understood of an operation of the human mind. Thus to discern and examine, are acts of the understanding; to judge and affirm, are acts of the will. There are voluntary and spontaneous acts: the former are produced by the operation of the soul, the latter without its privity or participation.

ACT, in the universities, signifies a thesis maintained in public by a candidate for a degree, or to show the capacity and proficiency of a student. The candidates for a degree of bachelor and master of arts are to hold philosophical acts; and those for bachelor of divinity, theological acts, &c. At Oxford, the time when masters or doctors complete their degrees is also called the act; which is held with great solemnity. At Cambridge, they call it the commencement.

ACT of Faith, Auto da Fe, in the Romish church, is a solemn day held by the inquisition, for the punishment of heretics, and the abolition of the innocent accused. They usually contrive the Auto to fall on some great day, when the execution may pass with the more awe and regard; at least it is always on a Sunday.

The Auto da Fe may be called the last act of the inquisitorial tragedy; it is a kind of goal-delivery, appointed as oft as a competent number of prisoners in the inquisition are convicted of heresy, either by their own voluntary, or exterior confession, or on the evidence of certain witnesses. The process is thus: in the morning they are brought into a great hall, where they have certain habits put on, which they are to wear in the procession. The procession is led up by dominican friars; after which come the penitents, some with fan-bones, and some without, according to the nature of their crimes; being all in black coats without sleeves, and bare-footed, with a wax-candle in their hands. These are followed by the penitents who have narrowly escaped being burnt, who over their black coats have flames painted with their points turned downwards, Fuego redundo. Next come the negative, and released, who are to be burnt, having flames on their habits pointing upwards. After these come such as profess doctrines contrary to the faith of Rome, who, besides flames pointing upwards, have their picture painted on their breasts, with dogs, serpents, and devils, all open-mouthed, about it. Each prisoner is attended with a familiar of the inquisition; and those to be burnt have also a Jesuit on each hand, who are continually preaching to them to abjure. After the procession of penitents comes a troop of familiars on horseback; and after them the inquisitors, and other officers of the court, on mules; last of all, the inquisitor-general on a white horse, led by two men with black hats and green hat bands. A scaffold is erected in the Terriero de Paua, big enough for two or three thousand people; at one end of which are the prisoners, at the other the inquisitors. After a sermon made up of encomiums on the inquisition, and inveigles against heretics, a priest ascends a dais near the middle of the scaffold, and having taken the abjuration of the penitents, recites the final sentence of those who are to be put to death; and delivers them to the secular arm, earnestly beseeching at the same time the secular power not to touch their blood, or put their lives in danger. The prisoners being thus in the hands of the civil magistrate, are presently loaded with chains, and carried first to the secular goal, and from thence in an hour or two brought before the civil judge; who, after asking in what religion they intend to die, pronounces sentence, on such as declare they die in the communion of the church of Rome, that they shall be first strangled, and then burnt to ashes; on such as die in any other faith, that they be burnt alive.' Both are immediately carried to the Ribera, the place of execution; where there are as many stakes set up as there are prisoners to be burnt, with a quantity of dry furze about them. The stakes of the professed, that is, such as perist in their heresy, are about four yards high, having a small board towards the top of the prisoner to be foasted on. The negative and relapsed being first strangled and burnt, the professed mount their stakes by a ladder; and the Jesuits, after several repeated exhortations to be reconciled to the church, part with them, telling them they leave them to the devil, who is standing at their elbow to receive their souls, and carry them with him into the flames of hell. On this a great shout is raised; and the cry is, Let the dogs boards be made; which is done by thrusting flaming furze fastened to long poles against the stakes. till their faces are burnt to a coal, which is accompanied with the loudest acclamations of joy. At last, fire is let to the furz at the bottom of the stake, over which the professed are chained so high, that the top of the flame seldom reaches higher than the seat they sit on, so that they rather seem roasted than burnt. There cannot be a more lamentable spectacle; the sufferers continually cry out while they are able, Misericordia por amor de Dios, "Pity for the love of God!" yecit is beheld by all fexes, and ages, with transports of joy and satisfaction.

ACT, in dramatic poetry, signifies a certain division, or part, of a play, designed to give some refpite both to the actors and spectators. The Romans were the first who divided their theatrical pieces into acts; for no such divisions appear in the works of the first dramatic poets. Their pieces indeed consisted of several parts or divisions, which they called protasis, epitasis, catastasis, and catastrophe; but these divisions were not marked by any real interruptions on the theatre. Nor does Aristotle mention any thing of acts in his Art of Poetry. But, in the time of Horace, all regular and finished pieces were divided into five acts.
The first act, according to some critics, besides introducing upon the stage the principal characters of the play, ought to propose the argument or subject of the piece; the second, to exhibit this to the audience, by carrying the fable into execution; the third, to raise obstacles and difficulties: the fourth, to remove these, or raise new ones in the attempt; and the fifth, to conclude the piece, by introducing some accident that may unravel the whole affair. This division, however, is not essentially necessary; but may be varied according to the humour of the author, or the nature of the subject. See Poetry, Part II. Sect. 1.

Act of Poetry. See Grace.

Act, among lawyers, is an instrument in writing for declaring or justifying the truth of any thing. In which sense, records, decrees, fentences, reports, certificates, &c. are called acts.

Acts, also denote the deliberations and resolutions of an assembly, senate, or convention: as acts of parliament, &c. Likewise matters of fact transmitted to posterity in certain authentic books and memoirs.

**Acta Consiliori** are the edicts or declarations of the council of state of the emperors. These edicts were generally expressed in such terms as these: "The august emperors, Diocletian and Maximian, in council declared, That the children of Decurions should not be exposed to wild beasts in the amphitheatre."

The senate and soldiery often swore, either through subject flattery or by compulsion, upon the edicts of the emperor, as we do upon the bible. And the name of Apelles Merula was erased by Nero out of the register of senators, because he refused to swear upon the edicts of the emperor Augustus.

**Acta Diurna** was a sort of Roman gazette, containing an authorized narrative of the transactions worthy of notice which happened at Rome. Petronius has given us a specimen of the acta diurna in his account of Trimalchius; and as it may not perhaps be uninteresting to see how exactly a Roman newspaper runs in the style of an American one, the following is an article or two out of it:

"On the 26th of July, 30 boys and 40 girls were born at Trimalchi's estate at Cuma."

"At the same time a slave was put to death for uttering detestable words against his lord."

"The same day a fire broke out in Pompey's gardens, which began in the night, in the steward's apartment."

**Acta Populi**, among the Romans, were journals or registers of the daily occurrences; as assemblies, trials, executions, buildings, births, marriages, deaths, &c. of illustrious persons, and the like. These were otherwise called **Acta Publica**, and **Acta Diurna**, or simply **Acta**. The **Acta** differed from **Annales**, in that only the greater and more important matters were in the latter, and those of less note were in the former. Their origin is attributed to Julius Caesar, who first ordered the keeping and making public the acts of the people. Some trace them higher, to Servius Tullius; who, to discover the number of persons born, dead, and alive, ordered that the next of kin, upon a birth, should put a certain piece of money into the treasury of Juno Lucina; upon a death, into that of Venus Libitina: the like was also to be done upon affirming the toga virilis, &c. Under Marcus Antoninus, this was carried further: persons were obliged to notify the births of their children, with their names and surnames, the day, consul, and whether legitimate or spurious, to the prefects of the **Aerarium Saturni**, to be entered in the public acts; though before this time the births of persons of quality appear thus to have been registered.

**Acta Senatus**, among the Romans, were minutes of what passed and was debated in the senate-house. These were also called **Commentarii**, and by a Greek name **εὐγένετα**. They had their origin in the consulship of Julius Caesar, who ordered them both to be kept and published. The keeping them was continued under Augustus, but the publication was abrogated. Afterwards all writings, relating to the decrees or sentences of the judges, or what passed and was done before them, or by their authority, in any cause, were also called by the name **Acts**: in which sense we read of civil acts, criminal acts, interdict acts; **agii civila, criminalia, intercessiva**, &c.

**Public Acts**. The knowledge of public acts forms part of a peculiar science, called the **Diplomatic**, of great importance to an historian, statesman, chronicler, and even critic. The preservation of them was the first occasion of erecting libraries. The style of acts is generally barbarous Latin. Authors are divided as to the rules of judging of their genuineness, and even whether there be any certain rule at all. F. Germain will have the greater part of the acts of former ages to be spurious. Fontaini afferts, that the number of forged acts now extant is very small. It is certain there were severe punishments inflicted on the forgers and falsifiers of acts. The chief of the English acts, or public records, are published by Rymer, under the title of **Eadem**, and continued by Saunders; an extract whereof has been given in French by Rapin, and translated into English under the title of **Acta Regia**. Great commendations have been given this work; also some exceptions made to it; as that there are many spurious acts, as well as errors, in it; some have even charged it with falsifications. The public acts of France fell into the hands of the English after the battle of Poitiers, and are commonly said to have been carried by them out of the country. But the tradition is not supported by any sufficient testimony.

**Acts of the Apostles**, one of the sacred books of the New Testament, containing the history of the infant-church, during the space of 29 or 30 years from the ascension of our Lord to the year of Christ 63. It was written by St. Luke; and addressed to Theophilus, the peron to whom the evangelist had before dedicated his gospel. We here find the accomplishment of several of the promises made by our Saviour; his ascension; the defeat of the Holy Ghost; the first preaching of the apostles, and the miracles whereby their doctrines were confirmed; an admirable picture of the manners of the primitive Christians; and, in short, every thing that passed in the church till the dispersion of the apostles, who separated themselves in order to propagate the gospel throughout the world. From the period of that separation, St. Luke quits the history of the other apostles, who were then at too great a distance from him, and confines himself more particularly to that of St. Paul, who had chosen him for the companion of his labours. He follows that apostle in all his missions, and
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[ 99 ] A C T

Act of Parliament of Great Britain, is a positive law, consisting of two parts, the words of the act, and its true sense and meaning; which being joined, make the law. The words of acts of parliament should be taken in a lawful sense. Cases of the same nature are within the intention, though without the letter, of the act; and some acts extant by equity to things not mentioned therein. See Parliament.

ACT 4., were meadows of remarkable verdure and luxuriance near the sea-shore, where the Romans used to indulge themselves to a great degree in fruits and delicacy of living. The word is used in this sense by Cicero and Virgil; but Voilius thinks it can only be used in speaking of Sicily, as these two authors did. ACT 8. A, A C O N I T U M R A C E M O S U M, Herb Christopher, or Bane-berries, a genus of the monogynia order, belonging to the polyanthera class of plants. The characters are: the calyx is a perianthium consisting of four roundish, obtuse, concave leaves, which fall off. The corolla consists of four petals, larger than the calyx, pointet at both ends, and falling off. The filament consists of numerous capillary filaments; the anthers are roundish, erect, and didymous. The pellitum has an ovate germ; no stamens; the stigma thickened and obliquely depressed. The poecipetalum is an oval smooth one-furrow'd one-cell'd berry. The seeds are very numerous, semiorbiculare, and inconstant in a double order. This genus is associated with the Multifolium, the 26th natural order. There are four species and properties. 1. The piciata, or common herb-christopher, is a native in several parts of Britain. It grows to the height of about two feet and a half; the foot-flakes of the leaves arise from the root; these divide into three smaller foot-flakes, each of which are again divided into three, and these have each three lobes, so that each leaf is composed of 27 lobes or smaller leaves. The flowers grow in ramous spires, and are of a pure white; they are borne upon a slender, jointed, furrowed stem; appear in May; and are succeeded by black, shining, pulpy berries, about the size of peas, which ripen in the autumn. This plant is a powerful repellant, and the root has been used internally in some nervous cases, but must be administered with caution. The berries are, highly poisonous. It is said toads resorted to this plant, on account of its fetid smell. Sheep and goats eat it; cows, horses, and swine refuse it. 2. The alba, or American herb-christopher, is a native of North America. The leaves of this species are somewhat like the former, but not so deeply indented in the edges. The flowers grow in ramous spires, and are of a pure white; they are borne upon a slender, jointed, furrowed stem; appear in May; and are succeeded by black, shining, pulpy berries, about the size of peas, which ripen in the autumn. This plant is a powerful repellant, and the root has been used internally in some nervous cases, but must be administered with caution. The berries are, highly poisonous. It is said toads resorted to this plant, on account of its fetid smell. Sheep and goats eat it; cows, horses, and swine refuse it.


and even Rome itself; for it appears that the Acts were published in the second year of St Paul's residence in that city, or the 26th year of the Christian era, and in the 9th or 10th year of Nero's reign. The style of this work, which was originally comprised in the canonical books, and it is observable, that St Luke, who was much better acquainted with the Greek than with the Hebrew language, always, in his quotations from the Old Testament, makes use of the Septuagint version. The council of Laodicea places the Acts of the Apostles among the canonical books, and all the churches have acknowledged it as such without any controversy.

\* See Abdias.
ACT

Acmon

Culture. The first species hath a perennial root, but the stalks annually decay. It may be propagated either by seeds, or parting the roots, which should be transplanted in autumn. The seeds should be sown soon after they are ripe, or they will lie a whole year in the ground before they vegetate. They should be sown in a shady border: and as all the plants do not come up at the same time, the border should not be disturbed till the following autumn, when they should be transplanted into a shady border, where they may be allowed to remain and flower.—The second species may be propagated in the same manner: only the plants should be allowed three feet every way, on account of their wide-spreading leaves. This species delights in a light soil, and shady situation.—The third is usually propagated by seeds sent annually from North America: it thrives in the same kind of soil as the former; and is very hardy, requiring no other culture than the common flowering-thrubs. The plants should not be often removed for that will prevent their flowering strongly.—The fourth requires a moist loamy soil, and shady situation. It may be propagated in the same manner as the others.

ACTEON, in Roman antiquities, was a great hunter. He was turned by Diana into a stag, for looking on her while bathing; and died by his own dogs.

ACTANIA, an island, according to Pliny, in the North sea. 'It lies to the west of Holstein and Dithmarsch, not far from the mouth of the Eyder and Elbe, and is now called Heystland.'

ACTE. See Samucus.

ACTIAN GAMES, in Roman antiquity, were solemn games instituted by Augustus, in memory of his victory over Marc Anthony at Actium, held every fifth year, and celebrated in honour of Apollo, since called Actius. Hence Actian Years, an area commencing from the battle of Actium, called the Era of Augustus. Virgil infinuates them to have been instituted by Aeneas; from that passage Aen. iii. v. 280.

Aen. iii. 280.

Adiages Ilacia celebramus litora ludi.

But this he only does by way of compliment to Augustus; attributing that to the hero from whom he descended, which was done by the emperor himself: as is observed by Servius.

ACTINIA, in zoology, a genus belonging to the order of vermes mollusces. The body is elongate and smooth, attacking itself firmly by its basis to rocks or other solid substances, having a dilatable apex hooked within. The mouth is furnished with crooked teeth, the rostrum cylindrical and radiated. There are five species, some of which make a beautiful appearance, and are called Animal Flowers. See Actinaria, and Urtica Martia. See Animal Flowers.

Progressive motion in these creatures is so slow, that it is difficult to perceive any, as they scarce advance the length of one inch in an hour. It would seem they do not all produce, when handled, the painful sensation which had acquired them the name of sea-nettle—They are viviparous, feed on shell-fish, open their mouth more or less according to the size of the prey they have to deal with, and then reject the shell through the same aperture. When the mouth is open, all the tentacula of the adelisins may be seen, resembling in that situation a full-blown flower, which has given it the denomination of the flower-fish.

ACTIO, in Roman antiquities, an action at law in a court of justice. The formalities used by the Romans, in judicial actions, were these: If the difference failed to be made up by friends, the injured persons proceeded in jure rem vocare, to summon the offending party to the court, who was obliged to go and give bond for his appearance.

The offending party might be summoned into court in suo voces, by the plaintiff himself meeting the defendant, declaring his intention to him, and commanding him to go before the magistrate and make his defence. If he would not go willingly, he might drag and force him along, unless he gave security for his appearance on some appointed day. If he failed to appear on the day agreed on, then the plaintiff, whenever he met him, might take him along with him by force, calling any bystanders to bear witness, by asking them uti se anteferunt; the bystanders upon this turned their ear towards him in token of their consent: To this Horace alludes in his Sat. against the impertinent, Lib. 1. Sat. 9. See this further explained under the article Atestarum.

Both parties being met before the praetor, or other supreme magistrate presiding in the court, the plaintiff proposed the action to the defendant; in which he designed to protract him. This they termed edere actionem; and was commonly performed by writing it in a tablet; and offering it to the defendant, that he might see whether he had better stand the suit or compound.

In the next place came the postulatio actionis, or the plaintiff's petition to the praetor, for leave to prosecute the defendant in such an action. The petition was granted by writing at the bottom of it aliudem, or refraining by writing in the same manner aliudem non.

The petition being granted, the plaintiff videbat reum, i.e. obliged him to give security for his appearance on such a day in the court; and this was all that was done in public, before the day fixed upon for the trial.

In the mean time, the difference was often made up, either transtulitiones, by letting the cause fall as dubious; or pactiones, by composition for damages among friends.

On the day appointed for hearing, the praetor ordered the several bills to be read, and the parties summoned by an accensus, or head. See Accensus.

Upon the non-appearance of either party, the defaultor lost his cause:—if they both appeared, they were said se metisse; and the plaintiff proceeded sumem jure aliudem intenderem, i.e. to prefer his suit, which was done in a set form of words, varying according to the difference of the actions. After this the plaintiff desired judgment of the praetor, that is, to be allowed a judicium or arbitrum, or else the recuperatores or contemnitori. These he requested for the hearing and deciding the business; but none of them could be denied but by the consent of both parties.

The praetor having assigned them their judges, defined and determined the number of witnesses to be admitted, to hinder the protrasting of the suit; and then the parties proceeded to give their caution, that the
ACTION, in general sense, implies nearly the same thing with Act. — Grammarians, however, observe a distinction between acts and act, the former being generally restricted to the common or ordinary transactions, whereas the latter is used to express those which are remarkable. Thus, we say it is a good action to comfort the unhappy; it is a generous act to deprive ourselves of what is necessary for their fake. The wife man propoees to himself an honest end in all his actions; a prince ought to mark every day of his life with some act of greatness. The abbe Girard makes a further distinction between the words action and act. The former, according to him, has more relation to the power that acts than the latter; whereas the latter has more relation to the effect produced than the former: and hence the latter is properly the attribute of the other.

Thus we may properly say, "Be sure to preserve a preference of mind in all your actions; and take care that they all be acts of equity."

ACTION, in mechanics, implies either the effort which a body or power makes against another body or power, or the effect itself of that effort.

As it is necessary in works of this kind to have a particular regard to the common language of mechanics and philosophers, we have given this double definition: but the proper signification of the term is the motion which a body really produces, or tends to produce, in another; that is, such is the motion it would have produced, had nothing hindered its effect.

All power is nothing more than a body actually in motion, or which tends to move itself; that is, a body which would move itself if nothing opposed it. The action therefore of a body is rendered evident to us by its motion only; and consequently we must not fix any other idea to the word action, than that of actual motion, or a simple tendency to motion. The famous question relating to vis viva, and vis mortua, owes, in all probability, its existence to an inadequate idea of the word action; for had Leibnitz and his followers observed, that the only precise and definite idea we can give to the word force or action, reduces it to its effect, that is, to the motion it actually produces or tends to produce, they would never have made that curious distinction.

Quantity of Action, a name given by M. de Maupertuis, in the Memoirs of the Parisian Academy of Sciences for 1744, and those of Berlin for 1746, to the product of the mass of a body by the space which it runs through, and by its celerity. He lays it down as a general law, "that, in the changes made in the state of abody, the quantity of action necessary to produce such a change is the least possible." This principle he applies to the investigation of the laws of refraction, of equilibrium, &c. and even to the ways of acting employed by the Supreme Being. In this manner M. de Maupertuis attempts to connect the metaphysics of final causes with the fundamental truths of mechanics, to show the dependence of the collision of both elastic and hard bodies upon one and the same law, which before had always been referred to separate laws; and to reduce the laws of motion, and those of equilibrium, to one and the same principle.

ACTION, in ethics, denotes the external signs or expressions of the sentiments of a moral agent. See Acts of Love, infra.

ACTION, in poetry, the same with fable or fable. Critics generally distinguish two kinds, the principal and the incidental. The principal action is what is generally called the fable; and the incidental an epistle. See Poetry, Part II.

ACTION, in oratory, is the outward department of the orator, or the accommodation of his countenance, voice, and gesture, to the subject of which he is treating. See Oratory, Part IV.

ACTION, in a theatrical sense. See Declaration, Art. IV.

ACTION for the Pulpit. See Declaration, Art. I.

ACTION, in painting and sculpture, is the attitude or position of the several parts of the face, body, and limbs of such figures as are represented, and whereby they seem to be really actuated by passions. Thus we say, the action of such a figure finely expresses the passions with which it is agitated; we also use the same expression with regard to animals.

ACTION, in physiology, is applied to the functions of the body, whether vital, animal, or natural.

The vital functions, or actions, are those which are absolutely necessary to life, and without which there is no life, as the action of the heart, lungs, and arteries. On the action and reaction of the fluids and fluids on each other, depend the vital functions. The pulse and respiration are the external signs of life. Vital diseases are all those which hinder the influx of the venous blood into the cavities of the heart, and the expulsion of the arterial blood from the same. — The natural functions are those which are instrumental in repairing the several losses which the body sustains; for life is destructive of itself, its very offices occasioning a perpetual waste. The manutacuation of food, the deplutition and digestion thereof, also the separation and distribution of the chyle and excrements parts, &c. are under the head of natural functions, as by their ordnance is converted into our nature. They are necessary to the continuance of our bodies. — The animal functions are those which we perform at will, as muscular motion, and all the voluntary actions of the body, they are those which constitute the senses of touch, taste, smell, sight, hearing; perception, reasoning, imagination, memory, judgment, affections of the mind. Without any, or all of them, a man may live, but not so comfortably as with them.

ACTION, in commerce, is a term used abroad for a certain part or share of a public company's capital stock. Thus, if a company has 400,000 livres capital stock, this may be divided into 400 actions, each confiting of 1000 livres. Hence a man is said to have two, four, &c. actions, according as he has the property of two, four, &c. 1000 livres capital stock. The transferring of actions abroad is performed much in the same manner as stocks are in England. See Stocks.

ACTION, in law, is a demand made before a judge for obtaining what we are legally intitled to demand, and is more commonly known by the name of law-suit or proces. See Suit.
ACTIONARY, or Actionist, a proprietor of a fleet in a trading company.

ACTIONS, among merchants, sometimes signify moveable effects; and we say the merchant's creditors have feized on all his actions, when we mean that they have taken possession of all his active debts.

ACTIVE, denotes something that communicates action or motion to another; in which acceptance it stands opposed to passive.

Active, in grammar, is applied to such words as express action; and is therefore opposed to passive. The active performs the action, as the passive receives it. Thus we say, a verb active, a conjugation active, &c. or an active participle.

Active Verbs, are such as do not only signify doing, or acting; but have also nouns following them, to be the subject of the action or impression: thus, To love, to teach, are verbs active; because we can say, To love a thing, to teach a man. Neuter verbs also denote an action, but are distinguished from active verbs, in that they cannot have a noun following them: such are To fly, to go, &c. — Some grammarians, however, make three kinds of active verbs: the transitive, where the action passes into a subject different from the agent: reflected, where the action returns upon the agent; and reciprocal, where the action turns mutually upon the two agents who produced it.

Active Power, in metaphysics, the power of executing any work or labour: in contradistinction to passive powers, or the powers of being, hearing, remembering, judging reasoning, &c.

The exertion of active power we call action; and as every action produces some change, so every change must be caused by some effect, or by the cessation of some exertion of power. That which produces a change by the exertion of its power, we call the cause of that change; and the change produced, the effect of that cause. See Metaphysics.

Active Principles, in chemistry, such as are supposed to act without any assistance from others; as mercury, sulphur, &c.

Activity, in general, denotes the power of acting, or the active faculty. See Active.

Sphere of Activity, the whole space in which the virtue, power, or influence, of any object, is exerted.

ACTIUM (anc. geog.), a town situated on the coast of Acarnania, in itself inconsiderable, but famous for a temple of Apollo, a safe harbour, and an adjoining promontory of the same name, in the mouth of the Sinus Ambracius, over against Nicopolis, on the other side of the bay: it afterwards became more famous on account of Augustus's victory over Anthony and Cleopatra; and for quinquennial games instituted there, called Attica or Ludi Atticæ. Hence the epithet Atticus, given to Apollo (Virgil). Attica era, a computation of time from the battle of Actium. The promontory is now called Capo di Fago.

ACTIU.S, in mythology, a surname of Apollo, from Actium, where he was worshipped.

ACTON, a town near London, where is a well that affords a purging water, which is noted for the pungency of its salt. This water is whitish, to the taste it is sweethith, with a mixture of the same bitter which is in the Epion water. The salt of this water is not quite so soft as that of Epion; and is more calcareous than it, being more of the nature of the salt of lime: for a quantity of the Acton water being boiled high, on being mixed with a solution of sublimate in pure water, threw down a yellow sediment. The salt of the Acton water is more nitrous than that of Epion; it strikes a deep red, or purple, with the tincture of logwood in brandy, as is usual with nitrous salts; it does not precipitate silver out of the spirit of nitre, as common salt does: 1 lb of this water yields 48 grains of salt.

ACTOR, in general, signifies a person who acts or performs something.

Actor, among civilians, the proctor or advocate in civil courts or causes: as, Actor ecclesiae has been sometimes used for the advocate of the church; actor dominicus for the lord's attorney; actor villa, the herald or head bailiff of a village.

Actor, in the drama, is a person who represents some part or character upon the theatre. The drama confided originally of nothing more than a simple chorus, who sung hymns in honour of Bacchus; so that the primitive actors were only singers and musicians. Thespis was the first that, in order to ease this unformed chorus, introduced a declaimer, who repeated some heroic or comic adventure. Eschylus, finding a single person tiresome, attempted to introduce a second, and changed the ancient recitals into dialogues. He also demiied his actors in a more majestic manner, and introduced the cithernus or luscinian. Sophocles added a third, in order to represent the various incidents in a more natural manner; and here the Greeks stopped, at least we do not find in any of their tragedies above three persons in the same scene. Perhaps they looked upon it as a rule of the dramatic poem, never to admit more than three speakers at a time on the stage; a rule which Horace has expressed in the following verse:

Nec quarta loci persona laboret.

This, however, does not prevent their increasing the number of actors in comedy. Before the opening of a play, they named their actors in full theatre, together with the parts they were to perform. The ancient actors were marked, and obliged to raise their voice extremely, in order to make themselves heard by the innumerable crowd of people who filled the amphitheatres: they were accompanied with a player on the flute, who played a prelude, gave them the tone, and played while they declaimed. Horace speaks of a kind of secondary actors, in his time, whose business was to imitate the first; and lessen themselves, to become better foils to their principals.

The moderns have introduced an infinite number of actors upon the stage. This heightens the trouble and distress that should reign there, and makes a diversity, in which the spectator is sure to be interested.

Actors were highly honoured at Athens. At Rome they were despised, and not only denied all rank among the citizens, but even when any citizen appeared upon the stage he was expelled his tribe and deprived of the right of suffrage by censors. Cicero, indeed, esteems the talents of Roscius: but he values his virtues still more; virtues which distinguished him so remarkably above all others of his profession, that they seemed to have exalted him from the theatre. The French have, in this respect, adopted the ideas of the Romans; and the English those of the Greeks.

Actor, the name of several persons in fabulous

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ACTUARIUS, a celebrated Greek physician, of the 13th century, and the Greek author who has treated of mild purgatives, such as castor oil, safflower, &c.

His works were printed in one volume folio, by Henry Stephens, in 1567.

ACTUARIUS, or ACTRESS, a notary or officer appointed to write the acts or proceedings of a court, or the like. In the Eastern Empire, the aktarri were properly officers who kept the military accounts, received the corn from the fuccepers or store-keepers, and delivered it to the soldiers.

ACTUARE, to bring into act, or put a thing in action. Thus an agent is said, by the schoolmen, to affume a power, when it produces an act in a subject. And thus the mind may be said to affume the body.

ACTUS, in ancient architecture, a measure in length equal to 120 Roman feet. In ancient agriculture, the word signified the length of one furrow or the distance a plough goes before it finishes.

ACTUS MINIMUS, was a quantity of land 120 feet in length, and four in breadth.

ACTUS MAJOR, or ACTUS Quadratus, a piece of ground in a square form, whose side was equal to 120 feet, equal to half the jugerum.

ACTUS INTEGIMENTALIS, a space of ground four feet in breadth, left between the lands as a path or way.

ACUANITES, in ecclesiastical history, the name of those called more frequently MANICURERS. They took the name from Acus, a disciple of Thomas one of the twelve apostles.

ACULEATS, or ACULEATI, a term applied to any plant or animal armed with prickles.

ACULEI, the prickles of animals or of plants.

ACULER, in the manage, is used for the motion of a horse, when, in working upon volts, he does not go far enough forward at every time or motion, so that his shoulders embrace or take in too little ground, and hisroupe comes too near the centre of the volt. Horses are naturally inclined to this fault in making demi-volts.

ACUMINA, in antiquity, a kind of military omen, most generally supposed to have been taken from the points or edges of darts, swords, or other weapons.

ACUNA (Christopher de), a Spanish Jesuit, born at Burgos. He was admitted into the society in 1612, being then but 15 years of age. After having devoted some years to study, he went to America, where he assisted in making converts in Chili and Peru. In 1640, he returned to Spain, and gave the king an account of how far he had succeeded in the commission he had received to make discoveries on the river of the Amazons; and the year following he published a description of this river, at Madrid. Acuna was sent to Rome, as procurator of his province. He returned to Spain with the title of Qualificador of the Inquisition; but soon after embarked again for the West Indies, and was at Lima in 1675, when father Southwell published at Rome the Bibliotheca of the Jesuit writers. Acuna's work is intitled, Nuevo descubrimiento del gran rio de las Amazonas; i.e. "a new discovery of the great river of the Amazons." He was ten months together upon this river, having had instructions to inquire into everything with the greatest exactness, that his majesty might thereby be enabled to render the navigation more
ACUPUNCTURE, the name of a surgical operation among the Chinese and Japanese, which is performed by pricking the part affected with a silver needle. They employ this operation in headaches, lethergies, convulsions, colics, &c.

ACUSA, in ichthyology, the trivial name of a species of synagathus. See SYNGATHUS.

ACUSIO COLONIA, now Ancone, according to Holstenius, between Orange and Valence, near Montelimart, on the banks of the Rhone.

ACUTE, an epithet applied to such things as terminate in a sharp point or edge. And in this sense it stands opposed to obtuse.

ACUTE ANGLE, in geometry, is that which is less than a right angle, or which does not subtend 90 degrees.

ACUTE-ANGLED TRIANGLE, is a triangle whose three angles are all acute.

ACUTE, in music, is applied to a sound or tone that is sharp or high, in comparison of some other tone. In this sense, acute stands opposed to grave.

ACUTE ACCENT. See ACCENT.

ACUTE DISORDER, such as come suddenly to a crisis. This term is used for all diseases which do not fall under the head of chronic.

ACUTATOR, in writers of the barbarous ages, denotes a person that whets or grinds cutting instruments; called also in ancient glossaries, acutor, acunvus, famarius, cobarius, &c. In the ancient armies there were acutators, a kind of smiths, retained for whetting or keeping the arms sharp.

AD, a Latin preposition, originally signifying to, and frequently used in composition both with and without the d, to express the relation of one thing to another.

AD BEASIS, in antiquity, is the punishment of criminals condemned to be thrown to wild beasts.

ADEM, in logic, a kind of argument drawn from the principles or prejudices of those with whom we argue.

ADA LUDUS, in antiquity, a sentence upon criminals among the Romans, whereby they were condemned to entertain the people by fighting either with wild beasts, or with one another, and thus executing justice upon themselves.

ADA METALLA, in antiquity, the punishment of such criminals as were condemned to the mines, among the Romans; and therefore called Metalliae.

ADA VALOREM, a term chiefly used in speaking of the duties or customs paid for certain goods: The duties on some articles are paid by the number, weight, measure, tale, &c.; and others are paid ad valorem, that is, according to their value.

ADAGE, a proverb, or short sentence, containing some wise observation or popular saying. Erasmus has made a very large and valuable collection of the Greek and Roman adages; and Mr Ray has done the same with regard to the English. We have also Kelly's collection of Scots Proverbs.

ADAGIO, in music. Adverbially, it signifies softly, leisurely; and is used to denote the slowest of all times. Used substantively, it signifies a slow movement. Sometimes this word is repeated, as adagio, adagio, to denote a still greater retardation in the time of the music.

ADALIDES, in the Spanish policy, are officers of justice, for matters touching the military forces. In the laws of king Alphonse, the adalides are spoken of as officers appointed to guide and direct the marching of the forces in time of war. Lopez represents them as a sort of judges, who take cognizance of the difference arising upon excursions, the distribution of plunder, &c.

ADAM, the first of the human race, was formed by the Almighty on the sixth day of the creation. His body was made of the dust of the earth; after which, God animated or gave it life, and Adam then became a rational creature.—His heavenly parent did not leave his offspring in a destitute state to shift for himself: but planted a garden, in which he caused to grow not only every tree that was proper for producing food, but likewise such as were agreeable to the eye, or merely ornamental. In this garden were assembled all the brute creation; and, by their Maker, caused to pass before Adam, who gave all of them names, which were judged proper by the Deity himself.—In this review, Adam found none for a companion to himself. This solitary state was seen by the Deity to be attended with some degree of unhappiness; and therefore he took Adam into a deep sleep, in which condition he took a rib from his side, and healing up the wound formed a woman of the rib he had taken out. On Adam's waking, the woman was brought to him; and he immediately knew her to be one of his own species, called his bone and his flesh, giving her the name of woman because she was taken out of man.

The first pair being thus created, God gave them authority over the inferior creation, commanding them to subdue the earth, also to increase and multiply and fill it. They were informed of the proper food for the beasts and for them; the grafs, or green herbs, being appointed for beasts; and fruits or seeds, for man. Their proper employment also was assigned them; namely, to dress the garden, and to keep it.

Though Adam was thus highly favoured and instruc-
ticed, the Tree of the Knowledge of Good and Evil. This prohibition, however, they soon broke through. The woman having entered into conversation with the Serpent, was by him persuaded, that by eating of the tree she should become as wise as God himslef; and accordingly, being invited by the beauty of the fruit, and its desirable property of imparting wisdom, she plucked and eat; giving her husband of it at the same time, who did likewise eat.

Before this transgression of the divine command, Adam and his wife had no occasion for clothes, neither had they any sense of shame; but immediately on eating the forbidden fruit, they were ashamed of being naked, and made aprons of fig-leaves for themselves. On hearing the voice of God in the garden, they were terrified, and hid themselves: but being questioned by the Deity, they confessed what they had done, and received sentence accordingly; the man being condemn- ed to labour; the woman to subjection to her husband, and to pain in childbearing. They were now driven out of the garden, and their access to it prevented by a terrible apparition. They had clothes given them by the Deity made of the skins of beasts. In this state Adam had several children; the names of only three of whom we are acquainted with, viz. Cain, Abel, and Seth. He died at the age of 930 years. These are all the particulars concerning Adam's life, that we have on divine authority: but a great number of stories are added by the Jews, Mahometans, and others; which indeed appear downright falsehoods or absurdities. That he was a handsome man is probable; but some writers, not content with this, affirm, that God, intending to create a perfect body, was either pleasing or power of producing his like, without the concur- rent assistance of woman. The division into two sexes, he imagined, was a consequeuce of man's sin; and now, the observers, mankind are become so many monsters in nature, being much less perfect in this respect than plants or trees, who are capable of producing their like alone, and without pain or misery. She even imagined, that, being in an ecstacy, we saw the figure of Adam before he fell, with the manner how, by himself, he was capable of procreating other men. "God," says she, "reprented to my mind the beauty of the first world, and the manner how he had drawn it from the chaos: every thing was bright, transparent, and darted forth light and ineffable glory. The body of Adam was purer and more transparent than crystal, and vailly fleet; through this body were seen vessels and rivuletts of light, which penetrated from the inward to the outward parts, through all his pores. In some vessels ran fluids of all kinds and colours, vailly bright, and quite diaphanous. The most ravishing harmony arose from every motion; and nothing resisted, or could annoy, him. His figure was taller than the preference of men: his hair was short, curled, and of a colour inclining to black; his upper lip covered with short hair: and instead of the beshial parts which modesty will not allow us to name, he was fashioned as our bodies will be in the life eternal, which I know not whether I dare reveal. In that region his nose was formed after the manner of a face, which diffused the most delicious fragrancy and perfumes; whence all men were to issue, all whose principles were inherent in him; there being in his belly a vail, where little eggs were formed; and a second vail filled with a fluid, which impregnated those eggs: and when man heated himself in the love of God, the desire he had that other creatures should exist besides himself, to praise and love God, caused the fluid abovementioned (by means of the fire of the love of God) to drop on one or more of these eggs, with inexpressible delight; which being thus impregnated, issued, some time after, out of man, by this canal, in the shape of an egg, whence a perfect man + i. e. the first man was hatched by inintensible degrees. Woman was formed by taking out of Adam's side the vessels that contained the eggs; which she still possesses, as is discovered by anatomists."

Many others have believed, that Adam at his first creation was both male and female: others, that he had two bodies joining together at the shoulders, and their faces looking opposite ways like those of Janus. Hence, say they, when God created Eve, he had no more to do than to separate the two bodies from one another.† Of all others, however, the opinion of Paracelsus seems the most ridiculous. Negatio primi parvis auctus lap- sum habiti partes generationis hominis necessariae; credit us parvulis accessisse, ut reservam gottifari. Extravagant things are asserted concerning Adam's knowledge. It is very probable that he was taught by the Deity how to accomplish the work appointed him, viz. to dress the garden, and keep it from being destroyed by the brute creatures; and it is also probable that he had likewise every piece of knowledge communicated to him that was either necessary or pleasing: but that he was acquainted with geometry, mathematics, rhetoric, poetry, painting, sculpture, &c. is too ridiculous to be credited by any sober person. Some rabbis,
...rabbis, indeed, have contented themselves with equaling Adam's knowledge to that of Moses and Solomon; while others, again, have maintained that he excelled the angels themselves. Several Christianists seem to be little behind the Jews in the degree of knowledge they ascribe to Adam; nothing being hid from him, according to them, except contingent events relating to futurity. One writer indeed (Pinedo) excepts politics; but a Carthusian friar, having exhausted, in favour of Aristotle, every image and comparison he could think of, at last affirms that Aristotle's knowledge was as extensive as that of Adam. —In consequence of this surprising knowledge with which Adam was endued, he is supposed to have been a confiderable author. The Jews pretend that he wrote a book on the creation, and another on the Deity. Some rabbis ascribe the 92d psalm to Adam; and in some manuscripts the Chaldee title of this psalm expressly declares that this is the song of praise which the first man repeated for the Sabbath-day.

Various conjectures have been formed concerning the place where man was first created, and where the garden of Eden was situated; but none of these have any solid foundation. The Jews tell us, that Eden was separated from the rest of the world by the ocean; and that Adam, being banished therefrom, walked across the sea, which he found every way fordable, by reason of his enormous stature. The Arabians imagined paradise to have been in the air; and that our first parents were thrown down from it on their transgression, as Vulcan is said to have been thrown down headlong from heaven by Jupiter. Strange stories are told concerning Adam's children. That he had none in the state of innocence, is certain from scripture; but that his marriage with Eve was not consummated till after the fall, cannot be proved from thence. Some imagine, that for many years after the fall, Adam denied himself the connubial joys by way of penance; others, that he cohabited with another woman, whose name was LILITH. The Mahometans tell us, that our first parents having been thrown headlong from the celestial paradise, Adam fell upon the isle of Serendib, or Ceylon, in the East Indies; and Eve on Iodda, a port of the Red Sea, not far from Mecca. After a separation of upwards of 200 years, they met in Ceylon, where they multiplied; according to some Eve had twenty, according to others only eight, deliveries; bringing forth at each time twins, a male and female, who afterwards married. The Rabbins imagine that Eve brought forth Cain and Abel at a birth; that Adam wept for Abel an hundred years in the valley of tears near Hebron, during which time he did not cohabit with his wife; and that this separation would probably have continued longer, had it not been forbid by the angel Gabriel. The inhabitants of Ceylon affirm, that the salt lake on the mountain of Colombo consists wholly of the tears which Eve for one hundred years together shed because of Abel's death.

Some of the Arabians tell us, that Adam was buried near Mecca on Mount Abukobes: others, that Noah, having laid his body in the ark, caused it to be carried after the deluge to Jerusalem by Melchisedek the son of Shem: of this opinion are the eastern Christianists; but the Persians assert that he was interred in the isle of Serendib, where his corps was guarded by lions at the time the giants warred upon one another. —St. Jerom imagined that Adam was buried at Hebron; others, on Mount Calvary. Some are of opinion that he died on the very spot where Jerusalem was afterwards built; and was buried on the place where Christ suffered, that so his bones might be sprinkled with the Saviour's blood!!

Adam (Melchior) lived in the 17th century. He was born in the territory of Grotkaw in Silesia, and educated in the college of Brégu, where the dukes of that name, to the utmost of their power, encouraged learning and the reformed religion as professed by Calvin. Here he became a firm Protestant; and was enabled to pursue his studies by the liberality of a person of quality, who had left several exhibitions for young students. He was appointed rector of a college at Heidelberg, where he published his first volume of ill-fated men in the year 1615. This volume, which consisted of philosophers, poets, writers on polite literature, and historians, was followed by three others; that which treated of divines was printed in 1619; that of the lawyers came next; and, finally, that of the physicians: the two last were published in 1620. All the learned men, whose lives are contained in these four volumes, lived in the 16th, or beginning of the 17th century, and are either Germans or Flemings; but he published in 1618 the lives of twenty divines of other countries in a separate volume. All his divines are Protestants. The Lutherans were not pleased with him, for they thought him partial; nor will they allow his work to be a proper standard whereby to judge of the learning of Germany. He wrote other works besides his lives, and died in 1622.

Adam's Apple, a name given to a species of Citrus. Adam's Needle. See Yucca.

Adam's Peak, a high mountain of the East Indies, in the isle of Ceylon, on the top of which they believe that the first man was created. See Adam.

Adam, or Adom, a town in the Peraea, or on the other side the Jordan, over-against Jericho, where the Jordan began to be dried up on the passage of the Israelites; (Joln.)

Adam, or Admah, one of the towns that were involved in the destruction of Sodom; (Moses.)

Adamant, a name sometimes given to the diamond. (See Diamond.) It is likewise applied to the sioras of gold, the magnet, &c.

Adamic Earth, a name given to common red clay, alluding to that species of earth of which the first man is supposed to have been made.

Adam's Poison, in anatomy, a protuberance in the fore-part of the throat, formed by the os hyoides. It is thought to be so called upon a strange conceit, that a piece of the forbidden apple which Adam eat, stuck by the way, and occasioned it.

Adamites, in ecclesiastical history, the name of a sect of ancient heretics, supposed to have been a branch of the Basilidians and Carpocratians.

Epiphanius tells us, that they were called Adamites from their pretending to be re-established in the state of innocence, and to be such as Adam was at the moment of his creation, whence they ought to imitate him in his nakedness. They detested marriage; maintaining that the conjugal union would never have taken place upon earth had it been unknown.
This obscure and ridiculous feat did not at first last long; but it was revived, with additional absurdities, in the twelfth century, by one Tanchelin, since known by the name of Tanchelin, who propagated his errors at Antwerp, in the reign of the emperor Henry V. He maintained, that there ought to be no distinction between priests and laitymen, and that fornication and adultery were meritorious actions. Tanchelin had a great number of followers, and was constantly attended by 3000 of these profligates in arms. His deed did not, however, continue long after his death; but another appeared under the name of Tartarinus, in Savoy and Dauphiny, where they committed the most brutal actions in open day.

About the beginning of the fifteenth century, one Picard, a native of Flanders, spread these errors in Germany and Bohemia, particularly in the army of the famous Zica, notwithstanding the severe discipline he maintained. Picard pretended that he was sent into the world as a new Adam, to re-establish the law of nature; and which, according to him, consisted in exposing every part of the body, and having all the women in common. This fact found also some partisans in Poland, Holland, and England: they assembled in the night; and it is asserted, that one of the fundamental maxims of their society was contained in the following verse:

furo, perjura, secretum prodere nos.

ADAMUS, the philosopher's stone is so called by alchemists; they say it is an animal, and that it has carried its invisible Eos in its body, since the moment they were united by the Creator.

ADAMSHIDE, a district of the circle of Ralfenborg, belonging to the king of Prussia, which, with Dombroaken, was bought, in 1737, for 42,000 dollars.

ADAMSON (Patrick), a Scottish prelate, archbishop of St Andrews. He was born in the year 1543 in the town of Perth, where he received the rudiments of his education; and afterwards studied philosophy, and took his degree of master of arts at the university of St Andrews. In the year 1566, he left for Paris, as tutor to a young gentleman. In the month of June of the same year, Mary queen of Scots being delivered of a son, afterwards James VI. of Scotland and First of England, Mr Adamson wrote a Latin poem on the occasion. This proof of his loyalty involved him in some difficulties, having been confined in France for six months; nor would he have easily got off, had not Queen Mary, and some of the principal nobility, interested themselves in his behalf. As soon as he recovered his liberty, he retired with his pupil to Bourges. He was in this city during the massacre at Paris; and the fame prevailing spirit prevailing among the catholics at Bourges as at the metropolis, he lived concealed for seven months in a public house, the master of which, upwards of 70 years of age, was thrown from the top thereof, and had his brains dashed out, for his charity to heretics. Whilst Mr Adamson lay thus in his sepulchre, as he called it, he wrote his Latin poetical version of the Book of Job, and his Tragedy of Herod in the same language. In the year 1575, he returned to Scotland; and, having entered into holy orders, became minister of Paisley. In the year 1575, he was appointed one of the commissioners, by the general assembly, to settle the jurisdiction and polity of the church; and the following year he was named, with Mr. David Lindsay, to report their proceedings to the earl of Morton, then regent. About this time the earl made him one of his chaplains; and on the death of bishop Douglas, promoted him to the archiepiscopal see of St Andrew's, a dignity which brought upon him great trouble and uneasiness: for now the clamour of the presbyterian party rose very high against him, and many inconsequent absurd stories were propagated concerning him. Soon after his promotion, he published his catechism in Latin verse, a work highly approved even by his enemies; but nevertheless, they still continued to persecute him with great violence. In 1578, he submitted himself to the general assembly, which procured him peace but for a very little time; for, the year following, they brought fresh accusations against him. In the year 1582, being attacked with a grievous disease, in which the physicians could give him no relief, he happened to take a simple medicine from an old woman, which did him service. The woman whose name was Alison Pearson, was thereupon charged with witchcraft, and committed to prison, but escaped out of confinement; however, about four years afterwards, she was again found and burnt for a witch. In 1583, King James came to St Andrews; and the Archibishop, being much recovered, preached before him, and disputed with Mr Andrew Melvil, in presence of his Majesty, with great reputation, which drew upon him fresh calumny and persecution. The king, however, was so well pleased with him, that he sent him ambassador to Queen Elizabeth, at whose court he resided for some years. His conduct, during his embassy, has been variously reported by different authors. Two things he principally laboured, viz. the recommending the king his master to the nobility and gentry of England, and the procuring some support for the episcopal party in Scotland. By his eloquent preaching, he drew after him fuch crowds of people, and raised in their minds such a high idea of the young king his master, that queen Elizabeth forbade him to enter the pulpit during his stay in her dominions. In 1584, he was recalled, and sat in the parliament held in August at Edinburgh. The Presbyterian party was still very violent against the archbishop. A provincial synod was held at St Andrew's in April 1586; the Archbishops was here accused and excommunicated; he appealed to the king and the states, but this availed him little; for the mob being excited against him, he durst scarce appear in public. At the next general assembly, a paper being produced containing the archbishop's submission, he was absolved from the excommunication. In 1588, fresh accusations were brought against him. The year following, he published the Lamentations of the prophet Jeremiah in Latin verse; which he dedicated to the king, complaining of his hard usage. In the latter end of the same year, he published a translation of the Apocalypse, in Latin verse; and a copy of Latin verses, addressed also to his Majesty, when he was in great distress. The king, however, was so far from having him affiance, that he granted the revenue of his fee to the duke of Lennox; so that the remaining part of this prelate's life was very wretched, he having hardly subsistence for his family. He died in 1591.

ADANA, a town of Asia, in Natalia, and in the province
ADA

Adanonia, province of Carmania. It is seated on the river Choquer; on the banks of which stands a strong little castle built on a rock. It has great number of beautiful fountains brought from the river by means of water-works. Over the river there is a flately bridge of fifteen arches, which leads to the water-works. The climate is very pleasant and healthy, and the winter mild and serene: but the summer is so hot as to oblige the principal inhabitants to retire into the neighbouring mountains, where they spend six months among shady trees and groves, in a moist delicious manner. The adjacent country is rich and fertile, and produces melons, cucumbers, pomegranates, pulse, and herbs of all sorts, all the year round; and in Jully, and the fruits ripen in October and November. It is very common in Senegal and the Cape de Verde islands; and is found 100 leagues up the country at Golum, and upon the sea-coast as far as Sierra-leona.

The age of this tree is perhaps no less remarkable than its enormous size. Mr. Adanson relates, that, in a botanical excursion to the Magdalene islands, in the neighbourhood of Goree, he discovered some calabash-trees from five to six feet diameter, on the bark of which were engraved or cut to a considerable depth a number of European names. Two of these names, which he was at the trouble to repair, were dated one the 14th, the other the 15th century. The letters were about six inches long, but in breadth they occupied a very small part only of the circumference of the trunk: from whence he concluded they had not been cut when these trees were young. These inscriptions, however, he thinks sufficient to determine pretty nearly the age which these calabash-trees may attain; for even supposing that those in question were cut in their early years, and that trees grew to the diameter of six feet in two centuries, as the engraved letters evince, how many centuries must be requisite to give them a diameter of 25 feet which perhaps is not the last term of their growth! The inscribed trees mentioned by this ingenious Frenchman had been seen in 1555, almost two centuries before, by Thetev, who mentions them in the relation of his voyage to Terra Antarctica or Australia. Adanson saw them in 1749.

The virtues and uses of this tree and its fruit are various. The negroes of Senegal dry the bark and leaves in the shaded air; and then reduce them to powder, which is of a pretty good green colour. This powder they preferve in bags of linen, and call it tillo. They use it every day, putting two or three pinches of it into a mea, whatever it happens to be, as we do pepper and salt: but their view is, not to give a relish to their food, but to preserve a perpetual and plentiful perspiration, and to attemper the too great heat of the blood; purposes which it certainly answers, as several Europeans have proved by repeated experiments, preferring themselves from the epidemic fever, which, in that country, destroys Europeans like the plague, and generally rages during the months of September and October, when, the rains having suddenly ceased, the fun exhales the water left by them upon the ground, and fills the air with a noxious vapour. M. Adanson, in that critical season, made a light pilfan of the leaves of the baobab, which he had gathered in the August of the preceding year, and had dried in the shade; and drank constantly about a pint of it every morning, either before or after breakfast, and the fame quantity of it every evening after the heat of the fun began to abate: he also sometimes took the same quantity in the middle of the day, but this was only when he felt some symptoms of an approaching fever. By this precaution he preserved himself, during the five years he resided at Senegal, from the diarrhoea and fever, which are so fatal there and,
Adansonia and which are, however, the only dangerous diseases of the place; and other officers suffered very severely, only one excepted, upon whom M. Adanson prevailed to use this remedy, which for its simplicity was defined by the text. This ptisan alone also prevents that heat of urine which is common in these parts, from the month of July to November, provided the person abstains from wine.

The fruit is not less useful than the leaves and the bark. The pulp that envelopes the seeds has an agreeable acid taste, and is eaten for pleasure: it is also dried and powdered, and thus used medicinally in febrile fevers, the dysentery, and bloody discharges, which are eaten with palm-oil that begins to be rancid.

The trunks of such of these trees as are decayed, the negroes hollow out into burying places for their poets, musicians, buffoons: persons of these characters they esteem greatly while they live, supposing them to derive their superior talents from forcery or a commerce with demons; but they regard their bodies with a kind of horror when dead, and will not give them burial in the usual manner, neither suffering them to be put into the ground, nor thrown into the sea or any river, because they imagine that the water would not then nourish the fiilh, nor the earth produce its fruits. The bodies shunt up in these trunks become perfectly dry without rotting, and forming a kind of mummies without the help of embalment.

The baobab is very distinct from the calabash-tree of America, with which it has been confounded by father Labat. See Crescentia.

Culture. This tree is propagated from seeds, which are brought from the countries where they grow naturally. Being natives only of hot climates, the plants will not thrive in the open air in Britain, even in summer. The seeds are therefore to be sown in pots, and plunged into a hot-bed, where they will appear in about six weeks, and in a short time after be fit to transplant. They must then be planted each in a separate pot, in light sandy earth, and plunged into a hot-bed, shading them until they have taken root: after which they should have fresh air admitted every day in warm weather; but must be sparingly watered, as being apt to rot. They grow quickly for two or three years, but afterwards make little progress; the lower part of the stem then begins to swell, and put out lateral branches, inclining to a horizontal position, and covered with a light grey bark. — Some of this kind of plants were raised from seeds obtained from Grand Cairo by Dr William Sherard, in 1724, and were grown to the height of 18 feet; but were all destroyed by the fever which in 1740; after which they were unknown in Britain till the return of Mr Adanson to Paris in 1754.

ADAPTORS, or Adopters. See Chemistry, (India).

ADAR, the name of a Hebrew month, answering to the end of February and beginning of March, the 12th of their sacred, and 6th of their civil year. On the 7th day of it, the Jews keep a fast for the death of Moses; on the 13th, they have the fast of Esther; and on the 14th, they celebrate the fast of Purim, for the deliverance from Haman's conspiracy. — At the lunar year, which the Jews followed in their calculations, is shorter than the solar by about 11 days, which at the end of three years make a month, they then intercalate a 13th month, which they call Veadar, or the fecond Adar.

ADARCE, a kind of concreted salts found on reeds and other vegetables, and applied by the ancients as a remedy in several cutaneous diseases.

ADARCON, in Jewish antiquity, a gold coin mentioned in scripture, worth about 13s. sterling.

ADARME, in commerce, a small weight in Spain, which is also used at Buenos-Aires, and in all Spanish America. It is the 16th part of an ounce, which at Paris is called the demi-gros. But the Spanish ounce is seven per cent. lighter than that of Paris. Stephens renders it in English by a dram.

ADATAIS, ADATIS, or ADATYS, in commerce, a mufin or cotton-cloth, very fine and clear, of which the piece is ten French ells long, and three quarters broad. It comes from the East-Indies; and the finest is made at Bengal.

ACCORDABILIS DECANT, in old law books, signify money paid by the valid to his lord, upon the selling or exchanging of a feud.

ADCRESCENTES, among the Romans, a kind of foildiery, entered in the army, but not yet put on duty; from these the flanging forces were recruited. See Accensi.

ADDA, in geography, a river of Switzerland and Italy, which rises in mount Brusio, in the country of the Grifons, and, passing through the Valteline, traverses the lake Como and the Milanene, and falls into the Po, near Cremona.

ADDEPHAGIA, in medicine, a term used by some physicians, for gluttony, or a voracious appetite. ADDER, in zoology, a name for the Viper. See Coluber.

Adder's-Bolts, or Adder's-bites. See Libellula.

Sea-Adder, the English name of a species of Sphenus. See Lata.

Water-Adder, a name given to the Coluber Naatrix.

Adder's-flung, is used in respect of cattle, when flung with any kind of venomous reptiles, as adders, scorpions, &c. or bit by a hedgehog or shrew. — For the cure of such bites, some use an ointment made of dragon's blood, with a little barley-meal, and the whites of eggs. See Varia-Wart, or Snake-wood. See Polygænum.

ADDEXTOROI, in the court of Rome, the pope's mitre-bearers, focalled, according to Ducange, because they walk at the Pope's right-hand when he rides to visit the churches.

ADDICE, or ADIZE, a kind of crooked ax used by shipwrights, carpenters coopers, &c.

ADJECTI, in antiquity, a kind of slaves, among the Romans, adjudged to serve some creditor whom they could not otherwise satisfy; and whose slaves they became till they could pay or work out of the debt.

ADDICTION, among the Romans, was the making,
Mr Addison's, reported to have up his abroad, particularly by the celebrated Boileau, who is. said to have it, that he would not have written to Mr Dryden, which procured him great reputation from the best judges. This was soon followed by a translation of the Fourth of Virgil, (omitting the fary of Arilidus), much commended by Mr Dryden. He wrote also the Essay on the Geogies, prefixed to Mr Dryden's translation. There are several other pieces written by him about this time; among the rest, one dated the 3rd of April 1694, addrefled to H. S. that is, Dr Sacheverel, who became afterwards fo famous, and with whom Mr Addison lived once in the greatest friendship; but their intimacy was some time after broken off by their disagreement in political principles. In the year 1695, he wrote a poem to king William on one of his campaigns, addrefdel to Sir John Somers lord keeper of the great seal. This gentleman received it with great approbation, took the author into the number of his friends, and bestowed on him many marks of his favour.

Mr Addison had been closely pressed, while at the university, to enter into holy orders; and had once resolved upon it: but his great modesty, his natural diffidence, and an uncommonly delicate sense of the importance of the sacred function, made him afterwards alter his resolution; and having expressed an inclination to travel, he was encouraged thereto by his patron abovementioned, who by his interest procured him from the crown a pension of L.300 per annum to support him in his travels. He accordingly made a tour to Italy in the year 1699; and, in 1701, he wrote a poetical epistle from Italy to the earl of Halifax, which has been universally esteemed as a most excellent performance. It was translated into Italian verse by the abbot Antonio Maria Salvinii, Greek professor at Florence. In the year 1705, he published an account of his travels, dedicated to lord Somers; which, though at first indifferently received, yet in a little time met with its deserved applause.

In the year 1702, he was about to return to England, when he received advice of his being appointed to attend prince Eugene, who then commanded for the emperor in Italy: but the death of king William happening soon after, put an end to this affair as well as his pension; and he remained for a considerable time unemployed. But an unexpected incident at once raised him, and gave him an opportunity of exerting his fine talents to advantage: for in the year 1704, the lord treasurer Godolphin happened to complain to lord Halifax, that the duke of Marlborough's victory at Blenheim had not been celebrated in verse in the manner it deserved; and intimated, that he would take it kindly, if his lordship, who was the known patron of the poets, would name a gentleman capable of doing justice to so elevated a subject. Lord Halifax replied, somewhat hastily, that he did know such a person, but would not mention him; adding, that long had he seen, with indignation, men of no merit maintained in luxury at the public expense, whilst those of real worth and modesty were suffered to languish in obscurity. The treasurer answered very coolly, that he was sorry there should be occasion for such an observation, but that he would do his endeavour to wipe off such reproaches for the
ADD[III]  

Addison.  

the future; and he engaged his honour, that whoever his lordship named, as a person capable of celebrating this victory, should meet with a suitable recompence. Lord Halifax thereupon named Mr Addison; insisting, however, that the treasurer himself should send to him; which he promised. Accordingly he prevailed on Mr Boyle (afterwards Lord Carlton) then chancellor of the exchequer, to make the proposal to Mr Addison; which he did in so polite a manner, that our author readily undertook the task. The lord-treasurer had a sight of the piece, when it was carried no farther than the celebrated fimile of the angel; and was so pleased with it, that he immediately appointed Mr Addison a commissioner of appeals, vacant by the promotion of Mr Locke, chosen one of the lords commissioners for trade. The Campaign is addressed to the Duke of Marlborough; it gives a short view of the military transactions in 1704, and contains a noble description of the two great actions at Schellemberg and Blenheim. In 1705, he attended Lord Halifax to Hanover; and the year following was appointed under-secretary to Sir Charles Hedges, secretary of state; in which office he acquired himself so well, that the earl of Sunderland, who succeeded Sir Charles in December, continued Mr Addison in his employment. 

A taste for opera begins at this time to prevail in England, and many persons having solicited Mr Addison to write one, he complied with their request, and composed his Rosamond. This, however, whether from the defect of the music, or from the prejudices in favour of the Italian taste, did not succeed upon the stage; but the poetry of it has, and always will, justly abound. About this time, Sir Richard Steele composed his comedy of the Tender Husband, to which Mr Addison wrote a prologue. Sir Richard surprized him with a dedication of this play, and acquainted the public, that he was indebted to him for some of the most excellent strokes in the performance. The marquis of Wharton, being appointed lord lieutenant of Ireland in 1709, took Mr Addison with him as his secretary. Her majesty also made him keeper of the records of Ireland, and, as a father mark of her favour, considerably augmented the salary annexed to that place. Whilst he was in this kingdom, the Tatler was first published; and he discovered his friend Sir Richard Steele to be the author, by an observation on Virgil, which he had communicated to him. He afterwards affiicted considerably in carrying on this paper, which the author acknowledges. The Tatler being laid down, the Spectator was left on foot. Mr Addison furnished great part of the most admired papers. The Spectator made its first appearance in March 1711, and was brought to a conclusion in September 1712. 

His celebrated Cato appeared in 1713. He formed the design of a tragedy upon his subject when he was very young, and wrote it when on his travels; he retouched it in England, without any intention of bringing it on the stage; but his friends being persuaded it would serve the cause of liberty, he was prevailed on by their solicitations, and it was accordingly exhibited on the theatre, with a prologue by Mr Pope, and an epilogue by Dr Garth. It was received with the most uncommon applause, having run thirty-five nights without interruption. The Whigs applauded every line in which liberty was mentioned, as a satire on the Tories; and the Tories echoed every clap, to show that the satire was unfelt. When it was printed, notice was given that the Queen would be pleased if it was dedicated to her; "but as he had designed that compliment elsewhere, he found himself obliged," says Tickell, "by his duty on the one hand, and his honour on the other, to send it into the world without any dedication." It was no less esteemed abroad, having been translated into French, Italian, and German; and it was acted at Leghorn, and several other places, with vast applause. The Jefuits of St Omers made a Latin version of it, and the students acted it with great magnificence.

About this time, another paper called the Guardian was published by Steele, to which Addison was a principal contributor. It was a continuation of the Spectator, and was distinguished by the same elegance and the same variety; but, in consequence of Steele's propensity to politics, was abruptly discontinued in order to write the Englishman.

The papers of Addison are marked in the Spectator by one of the letters in the name of Gite, and in the Guardian by a Hand. Many of these papers were written with powers truly comic, with nice discrimination of characters, and accurate observation of natural or accidental deviations from propriety; but it was not supposed that he had tried a comedy on the stage, till Steele, after his death, declared him the author of "The Drummer." This, however, he did not know to be true by any cogent testimony; for when Addison put the play into his hands, he only told him it was the work of a gentleman in the company; and when it was received, as is confessed, with cold disapprobation, he was probably less willing to claim it. Tickell omitted it in his collection; but the testimony of Steele, and the total silence of any other claimant, has determined the public to ascribe it to Addison, and it is now printed with his other poetry. Steele carried "The Drummer" to the playhouse, and afterwards to the press, and sold the copy for 50 guineas. To Steele's opinion may be added the proof supplied by the play itself, of which the characters are such as Addison would have delineated, and the tendency such as Addison would have promoted.

It is said that Mr Addison intended to have composed an English dictionary upon the plan of the Italian (Della Crusca); but, upon, the death of the queen being appointed secretary to the lords justices, he had not leisure to carry on such a work. When the earl of Sunderland was appointed lord lieutenant of Ireland, Mr Addison was again made secretary for the affairs of that kingdom; and upon the earl's being removed from the lieutenantcy, he was chosen one of the lords of trade.

Not long afterwards an attempt was made to revive the Spectator, at a time indeed by no means favourable to literature, when the succession of a new family to the throne filled the nation with anxiety, discord, and confusion; and either the turbulence of the times or the fatigue of the readers put a stop to the publication, after an experiment of 80 numbers, which were afterwards collected into an eighth volume, perhaps more valuable than any of those that went before it: Addison produced more than a fourth part.
In 1715, he began the Freetholder, a political paper, which was much admired, and proved of great use at that juncture. He published also, about this time, verses to Sir Godfrey Kneller upon the king's picture, and some to the princess of Wales with the tragedy of Cato.

Before the arrival of king George he was made secretary to the regency, and was required by his office to send notice to Hanover that the queen was dead, and that the throne was vacant. To do this would not have been difficult to any man but Addison, who was so overwhelmed with the greatness of the event, and so distracted by choice of expression, that the lords, who could not wait for the niceties of criticism, called Mr Southwell, a clerk in the house, and ordered him to dispatch the message. Southwell readily told what was necessary, in the common style of business, and valued himself upon having done what was too hard for Addison.

In 1716, he married the countess dowager of Warwick, whom he had solicited by a very long and anxious courtship. He is said to have first known her by becoming tutor to her son. The marriage, if uncontradicted report can be credited, made no addition to his happiness; it neither found them nor made them equal. She always remembered her own rank, and thought herself entitled to treat with very little ceremony the tutor of her son. It is certain that Addison has left behind him no encouragement for ambitious love. The year after, 1717, he rose to his highest elevation, being made secretary of state; but is represented as having proved unequal to the duties of his place. In the house of commons he could not speak, and therefore was useless to the defence of the government. In the office he could not infuse an order without losing his time in quelling of fine expressions. At last, finding by experience his own inability for public business, he was forced to solicit his discharge, with a pension of 1500l. a-year. Such was the account of those who were inclined to detract from his abilities; but by others his relinquishment was attributed to declining health, and the necessity of reces and quiet.

In his retirement, he applied himself to a religious work*, which he had begun long before; part of which, scarce finished, has been printed in his works.

He intended also to have given an English paraphrase of some of David's psalms. But his ailments increased, and cut short his designs. He had for some time been oppressed by an arithmetical disorder, which was now aggravated by a dropsey, and he prepared to die conformably to his precepts and professions. He sent, as Pope relates, a message by the earl of Warwick to Mr Gay, desiring to see him: Gay, who had not visited him for some time before, obeyed the summons, and found himself received with great kindnefs. The purpose for which the interview had been solicited was then discovered: Addison told him, that he had injured him; but that if he recovered, he would recom pense him. What the injury was he did not explain, nor did Gay ever know; but supposed that some preference design ed for him had by Addison's intervention been withheld. Another death-bed interview, of a more solemn nature, is recorded: Lord Warwick was a young man of very irregular life, and perhaps of loose opinions. Addison, for whom he did not want respect, had very diligently endeavoured to reclaim him; but his arguments and expostulations had no effect: One experiment, however, remained to be tried. When he found his life near its end, he directed the young lord to be called: and when he desired, with great tendernefs, to hear his last injunctions, told him, "I have sent for you that 'you may see how a Christian can die.' What effect this awful scene had on the earl's behaviour is not known: he died himself in a short time. Having given directions to Mr Tickell for the publication of his works, and dedicated them on his death-bed to his friend Mr Craggs, he died June 17, 1719, at Holland-house, leaving no child but a daughter who is still living.

Addison's course of life before his marriage has been detailed by Pope. He had in the house with him Budgell, and perhaps Philips. His chief companions were Steele, Budgell, Philips, Carey, Davenant, and Colonel Brett. With one or other of these he always breakfasted. He studied all morning; then dined at a tavern, and went afterwards to Button's. From the coffeehoufe he went again to the tavern, where he often sat late, and drank too much wine.

Dr Johnfon, in delineating the charactcr of Addison, observes that Tickell, that he employed wit on the side of virtue and religion. He not only made the proper use of wit himself, but taught it to others; and from his time it has been generally subservient to the cause of reason and truth. He has dissipated the prejudice that had long connected gaiety with vice, and easiness of manners with laxity of principles. He has restored virtue to its dignity, and taught innocence not to be ashamed. This is an elevation of literary character, "above all Greek, above all Roman fame." No greater felicity can genius attain than that of having purified intellectual pleasure, separated mirth from indecency, and wit from licentiousness; of having taught a succession of writers to bring elegance and gaiety to the aid of goodnefs; and, to use expressions yet more awful, of having "turned many to righteousness, ore outf chromium nature," or rafters merriment or wonder by the violation of truth. His figures neither divert by distortion, nor amaze by aggravation. He copies life with so much fidelity, that he can be hardly said to invent; yet his exhibitions have an air so much original, that it is difficult to suppose them not merely the product of imagination. As a teacher of wisdom he may be confidently followed. His religion has nothing in it enthusiastic or supercilious; he appears neither weakly credulous nor wantonly sceptical; his morality is neither dangerously lax nor impractically rigid. All the enchantment of fancy and all the cogency of argument are employed to recommend to the reader his real interest, the care of pleasing the Author of his being. Truth is shown sometimes as the phantom of a vision, sometimes as the allegory of an attribute; sometimes it attracts regard in the robes of fancy, and sometimes it is the only foundation in the confidence of reason: She wears a thousand dresses, and in all is pleasing.
The Doctor, however, has related the following anecdote, which every admirer of Addison, every man of feeling, must be reluctant to believe. — Steele (says the Doctor), whose imprudence of generosity, kept him almost invariably некедитов, upon some preling exigence, in an evil hour, borrowed an hundred pounds of his friend, probably without much purpose of repayment; but Addison, who seems to have had other notions of a hundred pounds, grew impatient of delay, and reclaimed his loan by an execution. Steele felt, with great sensibility, the obduracy of his creditor; but with emotions of sorrow rather than of anger. It is much to be wished, says Dr Kippis, that Dr Johnson had produced his authority for this narration. It is very possible, that it may be only a story the Doctor had somewhere heard in conversation, and which is entirely groundless: "and this I am the rather inclined to believe, as I have been assured by one of the most respectable characters in the kingdom; that the fact hath no foundation in truth." Mr Potter, in a late publication, hath informed us, that he is told by the best authority, that the story is an absolute falsehood.

Mr Tycers, in "An historical Essay on Mr Addison," printed, but not published, has mentioned some facts concerning him, with which we were not before acquainted. These are, That he was laid out for dead as soon as he was born: that, when he addressed his verses on the English poets to Henry Sacheverell, he courted that gentleman's sister; that, whenever Jacob Tonson came to him for the Spectator, Bayle's French Historical and Critical Dictionary lay always open before him; that, upon his return to England, after his travels, he discharged some old debts he had contracted at Oxford, with the generosity of good interest; that he was put into pleasant circumstances by the death of a brother in the East Indies; that, having received encouragement from a married lady, he had the industry to refill the temptation: that he refused a gratification of a three hundred pounds bank-note, and afterwards of a diamond ring of the same value, from a Major Dunbar, whom he had endeavoured to serve in Ireland by his interest with Lord Sunderland; and that his daughter by lady Warwick is still alive and unmarried, residing at Bilton near Rugby, and poffelling an income of more than twelve hundred a-year.

The following letter, which probably relates to the cafe of Major Dunbar, reflects great honour on Mr Addison's integrity. "June 26. 1715. Sir, I find there is a very strong opposition formed against you; but I shall wait on my lord lieutenant this morning, and lay your cause before him as advantageously as I can, if he is not engaged in other company. I am afraid what you say of his grace does not portend you any good. And now, Sir, believe me, when I affure you I never did, nor ever will, on any pretence whatsoever, take more than the flated and customary fees of my office. I might keep the contrary practice concealed from the world, were I capable of it, but I could not from myself; and I hope I shall always fear the reproaches of my own heart more than those of all mankind. In the mean time, if I can serve a gentleman of merit, and such a character as you have in the world, the satisfaction I meet with on such an occasion is always sufficient, and the only reward to, Sir, your most obedient, humble servant, ADDISON." — The following was told by the late Dr Birch. Addison and Mr Temple Stan­ yan were very intimate. "In the familiar conversations which passed between them, they were accustomed freely to dispute each other's opinions. Upon some occasion, Mr Addison lent Stanyan five hundred pounds. After this, Mr Stanyan behaved with a timid reserve, deference, and respect; not conversing with the same freedom as formerly, or canvassing his friend's sentiments. This gave great uneasiness to Mr Addison. One day, they happened to fall upon a subject on which Mr Stanyan had always been used strenuously to oppose his opinion. But, even upon this occasion, he gave way to what his friend advanced, without interposing his own view of the matter. This hurt Mr Addison so much, that he said to Mr Stanyan, "Either contradict me, or pay me the money.""

In Tickell's edition of Mr Addison's works there are several pieces hitherto unmentioned, viz. The Diff­ eration on Medals; which, though not published till after his death, yet he had collected the materials, and began to put them in order, at Vienna, in 1702. A pamphlet, intitled, The present State of the War, and the Necessity of an Augmentation, considered. The late Trial and Conviction of Count Tariff. The Whig Examiner came out on the 14th of September 1716; there were five of these papers attributed to Mr Addison, and they are the several pieces he ever wrote. He is said also to have been the author of a performance intitled Diferentiae de inexpectis Romanorum Poesis, and of a Discourse on Ancient and Modern learning.

ADDITIONAL, something added to another. Thus physicians call the ingredients added to a medicine already compounded, *additaments*. ADDITION, is the joining together or uniting two or more things, or augmenting a thing by the accession of others thereto. ADDITIONS, in ARITHMETIC, ALGEBRA, &c. See these articles.

ADDITION, in music, a dot marked on the right side of a note, signifying that it is to be founded or lengthened half as much more as it would have been without such mark.

ADDITION, in law, is that name or title which is given to a man over and above his proper name and surname, to shew what estate, degree, or mystery he is of and of what town, village, or country.

ADDITONS of Estate, of Quality, are, Yeoman, Gentle­man, Esquire, and such like.

ADDITONS of Degree, are those we call names of dignity; as Knight, Lord, Earl, Marquis, and Duke.

ADDITONS of Place, are, of Thorn, of Dale, of Woodstock. — Where a man hath household in two places, he shall be said to dwell in both; so that his addition in either may suffice. Knave was a locally a regular addition. By Stat. 1. Hen. V. cap. 5. it was ordained, that in such suits or actions where proofs of outlawry lies, such addition should be made to the name of the defendant, to show his estate, mystery, and place where he dwells; and that the writ not havi
ADELME, or ALDHEL, son to Kenred, nephew to Ina king of the West Saxons: after having been educated abroad, was abbot of Malmby 30 years. He was the first Englishman who wrote in Latin, the first who brought poetry into England, and the first bishop of Sherburn. He lived in great esteem till his death, which happened in 709. He was canonized, and many miracles were told of him. He is mentioned with great honour by Camden and Bayle, and his life was written by William of Malmbury.

ADELPHIANI, in church-history, a sect of ancient heretics, who fasted always on Sundays.

ADELSCALC, in ancient customs, denotes a servant of the king. The word is also written adeliscalchu, and adelascalchu. It is compounded of the German adel, noble, and scal, a servent, a slave, a servant. Among the Bavarians, adelascales appear to have been the name with royal thanes among the Saxons, and those called miniatri regis in ancient charters.

ADEMPTION, in the civil law, implies the revocation of a grant, donation, or the like.

ADEN, formerly a rich and considerable town of Arabia the Happy. It is seated by the sea-side, a little eastward of the straits of Babelmandel.

ADENANTHERA, BASTARD FLOWER-FENCE, a genus of the monogyne order, belonging to the candelaria class of plants. In the natural method, it belongs to the 31st order. Lomentoeae. The characters are: The calyx is a perianthium consisting of one very small five-toothed leaf. The corolla consists of five bell-shaped lanceolate sessile petals, convex within and concave under. The flamina has ten erect filaments shorter than the corolla; the antherae are roundish, incumbent, bearing a globular gland on the exterior top. The pistillum has a long gibbous stem, the stylus filibrated the length of the flamina; the stigma simple. The pericarpium is a long compressed membranaceous legumen. The seeds are very numerous, roundish, and remote. Only one species of this plant is known in Britain: but there is a variety, with scarlet seeds; which, however, is rare, and grows very slowly. It is a native of India, and rife to a considerable height. It is as large as the tamarind tree; spreads its branches wide on every side, and makes a fine shade; for which reason, it is frequently planted by the inhabitants in their gardens, or near their habitations. The leaves of this tree are doubly winged, the flowers of a yellow colour, and dispoised in a long bunch. These are succeeded by long twisted membranaceous pods, including several hard compressed seeds, of a beautiful scarlet, or shining black colour. This plant must be raised in a hot-bed, and kept during the winter in a close. 

ADENBURG, or ADENSBURG, a town of Westphalia, and in the duchy of Burg, subject to the Elector Palatine. It is 12 miles N. E. of Cologne, and 17 W. of Bonn: E. Long. 7. 25. Lat. 51. 2.

ADENOGRAPHY, that part of anatomy which treats of the glandular parts. See Anatomy.
ADHESION, in a general sense, implies the sticking or adhering of bodies together.

ADHSION, in philosophy. See Cohesion.

ADHESION, in anatomy, a term for one part sticking to another, which in a natural state are separate. For the most part, if any of those parts in the thorax or belly lie in contact, and inflame, they grow together. The lungs very frequently adhere to the pleura.

ADHIL, in astronomy, a star of the sixth magnitude, upon the garment of Andromeda, under the last star in her foot.

ADHOA, in ancient customs, denotes what we other wise call relief. In which sense we sometimes also find the word written adoba, admissions, adhognement.

ADIANTHUM, maiden-hair; a genus of the order of filices, belonging to the cryptogamia class of plants. The fructifications are collected in oval spots under the reflected tops of the fronds.

Species. Of this genus botanical writers enumerate fifteen species; the most remarkable are the following.

1. The capillus veneris, or true maiden-hair, is a native of the southern parts of France, from whence it is brought to Britain; though it is likewise said to grow plentifully in Cornwall, and the Trichomanes has been almost universally substituted for it. 2. The pedatum, or American maiden-hair, is a native of Canada; and grows in such quantities, that the French send it from thence in package for other goods, and the apothecaries of Paris use it for maiden-hair in the compositions wherein that is ordered. 3. The trapeziforme, or black American maiden-hair, is a native of Jamaica; and has shining black stalks, and leaves of an odd shape, which make an agreeable variety among other plants, so is sometimes cultivated in gardens.

Culture. The first species grows naturally out of the joints of walls, and fissures of rocks. It ought therefore to be planted in pots filled with gravel and lime-rubbish; where it will thrive much better than in good earth. It must also be sheltered under a frame during the winter.—The second is to be treated in the same manner; but the third will not thrive in Britain, unless kept in a stove during the winter.

Properties. The true maiden-hair has been greatly celebrated in disorders of the breast proceeding from a thinness and acrimony of the juices; and likewise for opening obstructions of the viscera, and promoting the expectoration of tough phlegm. But modern practice pays little regard to it; the asplenium trichomanes, or English maiden-hair, supplying its place. See Asplenium.

ADIAPHORISTS, in church-history, a name importing lukewarmness, given, in the 16th century, to the moderate Lutherans, who embraced the opinions of Melanthon, whose disposition to cloisterism was vastly more pacific than that of Luther.

ADIAPHOROUS, Adiaphorus, a name given by Mr Boyle to a kind of spirit distilled from tartar and some other vegetable bodies; and which is neither acid, vinous, nor urinary; but in many respects different from any other sort of spirit.

ADJAZZO, Adrazzo, or Ajaccio, in geography,
A D J  [116] A D J


debt; or that action by which the holder of an heritage right, labouring under any defect in point of form, may apply that defect. ADJUNCT, among philosophers, signifies something added to another, without being any necessary part of it. Thus water absorbed by cloth or a sponge, is an adjunct, but no necessary part of either of those substances.

ADJUNCT, in metaphysics, some quality belonging to either the body or mind, whether natural or acquired. Thus thinking is an adjunct of the mind, and growth an adjunct of the body.

ADJUNCT, in music, a word which is employed to denominate the connection or relation between the principal mode and the modes of its two-fifths, which, from the intervals that constitute the relation between them and it, are called its adjuncts.

ADJUNCT is also used to signify a colleague, or some person associated with another as an assistant.

ADJUNCTS, or Adjuncts of the Gods, among the Romans, were a kind of inferior deities, added as assistants to the principal ones, to cave them in their functions. Thus, to Mars was adjointed Bellona and Nemesis; to Neptune, Salacia; to Vulcan, the Cabi- ri; to the Good Genius, the Lares; to the Evil, the Lemures, &c.

ADJUNCTS, in rhetoric and grammar, signify certain words or things added to others, to amplify or augment the force of the discourse.

ADJUNCTS, or Adjoints, in the royal academy of sciences at Paris, denote a class of members, attached to the pursuit of particular sciences. The class of Adjuncts was created in 1716, in lieu of the Eleves; they are twelve in number; two for geometry, two for mechanics, two for astronomy, two for anatomy, two for chemistry, and two for botany. The Eleves not taken into this establishment were admitted on the foot of supernumerary Adjuncts.

ADJUTANT, in the military art, is an officer whose business it is to assist the major. Each battalion of foot and regiment of horse has an adjutant, who receives the orders every night from the brigade-major; which, after carrying them to the colonel, he delivers out to the serjeants. When detachments are to be made, he gives the number to be furnished by each company or troop, andassigns the hour, and place of rendezvous. He also places the guards; receives, and distributes the ammunition to the companies, &c.; and, by the major's orders, regulates the prices of bread, beer, and other provisions. The word is sometimes used by the French for an aide-du-camp.

ADJUTANTS-general, among the Jeluits, a select number of fathers, who resided with the general of the order, each of whom had a province or country assigned him, as England, Holland, &c. and their business was to inform the father-general of state-occurrences in such countries. To this end they had their correspondents delegated, emissaries, visitors, regents, provincials, &c.

ADJUTORIUM, a term used by physicians for any medicine in a prescription but the capital one.

ADLE-EGGS, such as have not received an impregnation from the semen of the cock.

ADLEGATION, in the public law of the German empire, a right claimed by the states of the empire of
ADMIRABILIS SAT, the same with GLAUBER'S. See CHEMISTRY, No. 124.

ADMIRAL, a great officer or magistrate, who has the government of a navy, and the hearing of all marine causes.

Authors are divided with regard to the origin and denomination of this important officer, whom we find established in most kingdoms that border on the sea. But the most probable opinion is that of Sir Henry Spelman, who thinks, that both the name and dignity were derived from the Saracens, and, by reason of the holy wars, brought into Europe; for admiral, in the Arabian language, signifies a prince, or chief ruler, and was the ordinary title of the governors of cities, provinces, &c. and therefore they called the commander of the navy by that name, as a name of dignity and honour. And indeed there are no instances of admirals in any part of Europe before the year 1284, when Philip of France, who had attended St. Lewis in the wars against the Saracens, created an admiral. Du Cange affirms us, that the Sicilians were the first, and the Genoese the next, who gave the denomination of Admiral to the commanders of their naval armaments; and that they took it from the Saracen or Arabic Emir, a general name for every commanding officer. As for the exact time when the word was introduced in England, it is uncertain; some think it was in the reign of Edward I.,

which have leave to trade along that coast, are obliged to unload here, paying 13 per cent. of the price they sell for, if the cargo be entire, and even 16 per cent. if otherwise; besides which, they pay 3 per 1000, duty, for consulship and some other small royal rights and claims.

ADMINISTRATOR, in law, he to whom the ordinary commits the administration of the goods of a person deceased, in default of an executor. An action lies for, or against an administrator, as for, or against an executor; and he shall be accountable to the value of the goods of the deceased, and no farther—unless there be waste, or other abuse chargeable on him. If the administrator die, his executors are not administrators; but the court is to grant a new administration.

If a stranger, who is neither administrator nor executor, takes the goods of the deceased, and administers, he shall be charged, and sued as an executor, nor as an administrator. The origin of administrators is derived from the civil law. Their establishment in England is owing to a statute made in the 31st year of Edw. III. Till then, no office of this kind was known beside that of executor; in case of a want of which, the ordinary had the disposal of goods of persons intestate, &c.

ADMINISTRATOR, in Scots law, a person legally empowered to act for another whom the law presumes incapable of acting for himself. Thus tutors or curators are sometimes styled administrators in law to pupils, minors, or fatusous persons. But more generally the term is used to imply that power which is conferred by the law upon a father over the persons and estates of his children during their minority. See LAW, No. 124.

ADMINISTRATOR is sometimes used for the president of a province; for a person appointed to receive, manage, and distribute, the revenues of an hospital or religious house; for a prince who enjoys the revenues of a secularized bishopric; and for the regent of a kingdom during a minority of the prince, or a vacancy of the throne.

ADMINISTRATOR, in law, the right of offending or being offended, in matters of direction, which relate to the empire in general. In which sense adilegation differs from legation, which is the right of sending ambassadors on a person's own account. Several princes and states of the empire enjoy the right of legation, who have not that of adilegation, and vice versa. The bishops, for instance, have the right of adilegation in the treaties which concern the common interest, but no right of legation for their own private affairs. The like had the duke of Mantua.

The emperor allows the princes of Germany the privilege of legation, but disputes that of adilegation. They challenge it as belonging to them juris regis, which they enjoy in common with the emperor himself.

ADLOCUTION, adlocutio, in antiquity, is chiefly understood of speeches made by Roman generals to their armies, to encourage them before a battle. We frequently find these adlocutions expressed on medals by the abbreviation adlocut. coh. —This general is sometimes represented as seated on a tribunal, often on a hill or mount of turf, with the cohorts ranged orderly round him, in manipuli et turmae. The usual formula in adlocutions was, Fortis eft et fideli.

ADMANUENSES, in ancient law books, denote persons who swore by laying their hands on the book.

—in which sense, admanuentis is the same to the law with laymen; and stands opposed to clerks, who were forbidden to swear on the book, their word being to be reputed as their oath; whereas they were also denominated fideli digni.

ADMEASUREMENT, admeasureatio, in law, a writ which lies for the bringing thofe to reason, or multifcription, as they usurp more of any thing than their share. This writ lies in two cases; termed

ADMEASUREMENT of Dower. Admeasureatio dotis, where the widow of the deceased holds more from the heir, or his guardian, on account of her dower, than of right belongs to her. And,

ADMEASUREMENT of Pasture, Admeasureatio pasturae; this lies between thoé who have common of pastures appendant to their freehold, or common by vicinage, in case any of them forcharge the common with more cattle than they ought.

ADMINICLLE, a term used chiefly in old law-books, to imply an aid, help, alidance, or support. The word is Latin, adinicionem; and derived from ad minister, to prop or support.

ADMINICLLE, in Scots law, signifies any writing or deed referred to by a party in an action of law, for proving his allegations.

ADMINICULATOR, an ancient officer of the church, whose business it was to attend to and defend the cause of the widows, orphans, and others deficient of help.

ADMINISTRATION, in general, the government, direction, or management of affairs, and particularly the exercise of distributive justice; among ecclesiastics, it is often used to express the giving or dispensing of the tithes, &c.

ADMINISTRATION, is also the name given by the Spaniards in Peru to the flape magazine, or warehouse, established at Callao, a small town on the S. Sea, which is the port of Lima, the capital of that part of South America, and particularly of Peru. The foreign ships,
Admiral. Edward I. Sir Henry Spelman is of opinion that it was first used in the reign of Henry III., because neither the laws of Oleron made in 1266, nor bracton, who wrote about that time, make any mention of it; and that the term "admiral" was not used in a charter in the eighth of Henry III., wherein he granted this office to Richard de Lacey, by these words Maritimum Angliae; but in the 56th year of the same reign, not only the historians, but the charters themselves, very frequently use the word "admiral.

Anciently there were generally three or four admirals appointed in the English seas, all of them holding the office durante bene placito: and each of them having particular limits under their charge and government: as admirals of the fleet of ships, from the mouth of the Thames northward, southward, and westward. Besides these, there were admirals of the Cinque Ports, as in the reign of Edward III. when one William Latimer was styled admirals quinque portuum; and we sometimes find that one person has been admiral of the fleet to the southward, northward, and westward: but the title of admiral of England was not frequent till the reign of Henry IV. when the king's brother had that title given him, which in all commissions afterwards was granted to the succeeding admirals. It may be observed, that there was a title above that of admiral of England, which was locum-tenens regis super mare, the king's lieutenant general of the seas; this title we find mentioned in the reign of Richard II. Before the use of the word "admiral" was known, the title of etatis maris was made use of.

Lord High Admiral of England, in some ancient records called capitenus maritimorum, an officer of great antiquity and trust, as appears by the laws of Oleron, so denominated from the place they were made at by Richard I. The first title of Admiral of England, expressly conferred upon a subject, was given by patent of Richard II. to Richard Fitz-Allen, jun., earl of Arundel and Surrey; for those who before enjoyed this office were simply termed admirals, though their jurisdiction seems as large, especially in the reign of Edward III. when the court of admiralty was first erected.

This great officer has the management of all maritime affairs, and the government of the royal navy, with power of decision in all maritime cases both civil and criminal: he judges of all things done upon or beyond the seas, in any part of the world; upon the sea-coasts, in all ports and havens, and upon all rivers below the first bridge from the sea. By him, vice-admirals, rear-admirals, and all sea-captains are commissioned: all deputies for particular coasts, and coroners to view dead bodies found on the sea-coasts, or at sea; he also appoints the judges for his court of admiralty, and may imprison, release, &c. All ports and havens are infra corpus comitatus, and the admiral hath no jurisdiction of any thing done in them. Between high and low water mark, the common-law and the high-admiral have jurisdiction by turns, one upon the water, and the other upon the land.

The lord-admiral has power, not only over the seamen serving in his ships of war, but over all other seamen, to arrest them for the service of the state: and if any of them run away, without leave of the admiral, he hath power to make a record thereof, and certify the same to the sheriffs, mayors, bailiffs, &c. who shall cause them to be apprehended and imprisoned.

To the lord high-admiral belong all penalties and amerceements of all transgressions at sea, on the sea-floreat, and ports and havens, and all rivers below the first bridge from the sea; the goods of pirates and felons condemned or enslaved, sea-wrecks, goods floating on the sea, or cast on the shore (not granted to lords of manors adjoining to the sea), and a share of lawful prizes, also great fishes, commonly called royal fishes, except whales and sturgeons: to which add, a salary of 7000l. a year.

In short, this is so great an office, in point of trust, honour, and profit, that it has been usually given to princes of the blood, or the most eminent persons among the nobility. There has been no high admiral for some years; the office being put in commission, or under the administration of the lords commissioners of the admiralty, who by statute have the same power and authority as the lord high admiral.

Lord High Admiral of Scotland, one of the great officers of the crown, and supreme judge in all maritime cases within that part of Britain. See Law, Part III. of Civil.

Admiral, also implies the commander in chief of any single fleet or squadron, or, in general, any flag-officer whatever. The commander of a fleet carries his flag at the main-top-mast head.

Vice Admiral, is the commander of the second squadron, and carries his flag at the fore-top-mast head.

Rear Admiral, is the commander of the third squadron, and carries his flag at the mizen-top-mast head.

Vice Admiral, is also an officer appointed by the lords commissioners of the admiralty. There are several of these officers established in different parts of Great Britain, with judges and martials under them, for executing jurisdiction within their respective limits. Their decrees, however, are not final, an appeal lying to the court of admiralty in London.

Admiral is also an appellation given to the most considerable ships of a fleet of merchant-men, or of the vessels employed in the cod-fishery of Newfoundland. This last has the privilege of choosing what place he pleases on the shore to dry his fish; gives proper orders, and appoints the fishing places to those who come after him; and as long as the fishing season continues, he carries a flag on his main-mast. Admiral, in zoology, the English name of a species of the voluta, a shell-fish belonging to the order of Vermes testacea. See Voluta.

Admiralty properly signifies the office of lord high-admiral, whether discharged by one single person, or by joint commissioners called lords of the admiralty.

Court of Admiralty, is a sovereign court, held by the lord high-admiral, or lords of the admiralty, where cognizance is taken in all maritime affairs, whether civil or criminal. All crimes committed on the high-seas, or on the great rivers below the first bridge next the sea, are cognizable in this court only, and before which they must be tried by judge and jury. But in civil causes the mode is different, the decisions being all made according to the civil law. From the sentences of the admiralty-judge an appeal always lay, in ordinary course, to the king in chancery, as might be collected from statute 25 Hen. VIII. c. 19. which directs the appeal from the archbishop's courts to be determined by persons named in the king's commission, like as in
Admiration "cafe of appeal from the admirals-court." But this is also expressly declared by statute 8 Eliz. ed 5, which enacts, that upon an appeal made to the chancery, the sentence definitive of the delegates appointed by commission shall be final.

Appeals from the vice-admiralty courts in America, and other plantations and settlements, may be brought before the courts of admiralty in England, as being a branch of the admiral's jurisdiction, tho' they may also be brought before the king in council. But in case of prize vessels, taken in time of war, in any part of the world, and condemned in any courts of admiralty or vice-admiralty as lawful prize, the appeal lies to certain commissioners of appeals constituting chiefly of the privy council, and not to judges delegates. And this by virtue of divers treaties with foreign nations, by which particular courts are established in all the maritime countries of Europe for the decision of this question, whether lawful prize or not? for this being a question of subjects of different states, it belongs entirely to the law of nations, and not to the municipal laws of either country, to determine it.

Court of Admiration in Scotland. See Law, Part III. No. 15.

Admiration Islands, lie in about 2° 18'. S. Lat. and 16° 44'. E. long. There are between 20 and 30 islands said to be scattered about here, one of which alone would make a large kingdom. Captain Carteret, who first discovered them, was prevented touching at them, although their appearance was very inviting, on account of the condition of his ship, and of his being entirely unprovided with the articles of barter which suit an Indian trade. He describes them as clothed with a beautiful vegetation of woods, lofty and luxuriant, interspersed with spots that have been cleared for plantations, groves of cocoa nut-trees, and houfes of the natives, who seem to be very numerous. The largest of these islands is 18 leagues long in the direction of east and west. The discoverer thinks it highly probable that these islands produce several valuable articles of trade, particularly spices, as they lie in the same climate and latitude as the Moluccas.

Admonition, in ecclesiastical affairs, a part of discipline much used in the ancient church. It was the first act or step towards the punishment or expiation of delinquents. In case of public offences, it was performed according to the evangelical rule, privately, in case of public offence, openly, before the church. If either of those sufficed for the recovery of the fallen person, all further proceedings in the way of confession ceased: if they did not, recourse was had to excommunication.

Adonitio Filiation, among the Romans, a military punishment, not unlike our whipping, only it was performed with viole-branches.

Adorations, in the feudal customs, the reduction of the property of lands or tenements to mortmain. See Mostmain.

Adnata, in anatomy, one of the costs of the eye, which is also called conjunctiva and albuginea.

Adnata, is also used for any hair, wool, or the like, which grows upon animals or vegetables.

Adnata, or insecuta, among gardeners, denote those off-sents, which, by a new germination under the earth, proceed from the lily, narcissus, hyacinth, and, other flowers, and afterwards grow to true roots. The French call them caudex, "stalks."

ADNOUN, is used by some grammarians to express what we more usually call an Adjective. The word is formed by way of analogy to adverb; in regard adjectives have much the same office and relation to nouns as adverbs have to verbs. Bishop Wilkins uses the word adnans in another sense, viz. for what we otherwise call a preposition.

ADOLESCENCE, the state of growing youth; or that period of a person's age commencing from his infancy, and terminating at his full stature or manhood. The word is formed of the Latin adolescent, to grow. — The state of adolescence lasts so long as the fibres continue to grow, either in magnitude or firmness. The fibres being arrived at the degree of firmness and tension sufficient to sustain the parts, no longer yield or give way to the efforts of the nutritious matter to extend them; so that their further accretion is stopped, from the very law of their nutrition. Adolescence is commonly computed to be between 15 and 25, or even 30 years of age; though in different constitutions its terms are very different. — The Romans usually reckoned it from 12 to 25 in boys; and to 21 in girls, &c. And yet, among their writers, juvenis and adolecentis are frequently used indifferently for any person under 45 years.

ADOLLAM, or ODOLLAM (anc. geog.), a town in the tribe of Judah, to the east of Eleutheropolis. David is said to have hid himself in a cave near this town. (Bible.)

ADON, a populous village in the province of Stuhl-Weiltemberg, belonging to Hungary. It lies in a fruitful country, towards the river Danube. Long. 49° 20'. Lat. 47° 30'.

ADONIA, one of the names of the Supreme Being, in the scriptures. The proper meaning of the word is my lord, in the plural number; as Adon in my lord, in the singular. The Jews, who either out of respect or superstition, do not pronounce the name of Jehovah, read Adonai in the room of it, as often as they meet with Jehovah in the Hebrew text. But the ancient Jews were not so superstitious; nor is there any law which forbids them to pronounce the name of God. Calmet.

ADONIA, in antiquity, solemn feasts in honour of Venus, and in memory of her beloved Adonis. The Adonia were observed with great solemnity by most nations; Greeks, Phoenicians, Lyceans, Syrians, Egyptians, &c. From Syria, they are supposed to have passed into India. The prophet Ezekiel is understood to speak of them. They were still observed at Alexandria in the time of St Cyril; and at Antioch in that of Julian the apostate, who happened to enter that city during the solemnity, which was taken for an ill omen. The Adonia lasted two days: on the first of which certain images of Venus and Adonis were carried, with all the pomp and ceremonies practised at funerals; the women wept, tore their hair, beat their breasts, &c. imitating the cries and lamentations of Venus for the death of her paramour. This lamentation they called Adonias. The Syrians were not contented with weeping, but gave themselves discipline, shaved their heads, &c. Among the Egyptians, the queen herself used to carry the image of Adonis in procession. St. Cyril mentions an extraordinary ceremony practised by the Alexandrians: A letter was written to the women of Byblus, to inform them that...
Adonids. Adonis was found again: this letter was thrown into the sea, which (it was pretended) did not fail punctually to convey it to Byblus in seven days; upon the receipt of it by a train of anniversaries, consisting for pleasure than profit.

Adonis, son to Cinyras king of Cyprus, the darling of the god Venus: being killed by a wild boar in the Idaian woods, he was turned into a flower. Venus was inconsolable; and no grief was ever more celebrated than this, most nations having perpetuated the memory of it by a train of anniversaries. Among Shakespeare's poems, is a long one on the subject of Venus's affection for Adonis.

The text of the vulgate in Ezekiel, viii. 14. says, that this prophet saw women sitting in the temple, and weeping for Adonis; but according to the reading of the Hebrew text, they are said to weep for Tammuz, or the hidden one. Among the Egyptians, Adonis was adored under the name of Osiris the husband of Isis. But he was sometimes called by the name of Ammuz, or Tammuz, the concealed, to denote probably his death or burial. The Hebrews, in derision, call him sometimes the dead. Psal. civ. 28. and Lev. xix. 28. because they wept for him, and represented him as one dead in his coffin: and at other times, they called him the image of jealousy, Ezek. viii. 3. 5. because he was the object of the god Mars's jealousy. The Syrians, Phoenicians, and Cyprians called him Adonis, and P. Calmet is of opinion, that the Ammonites and Moabites gave him the name of Baal-peor. See Baal-peor.

Adonis, Adonis, (anc. geog.): a river of Phoenicia, rising in Mount Lebanon, and falling into the sea, after a north-west course, at Byblus: famous in fable, as a beautiful shepherds youth, (Virgil;) son of Cynaras, king of the Cyprians, loved by Venus, slain by a boar, and turned into a river. Theoricius lamented him dead in an idyllion, or rather ode, as did the women yearly, when in flood time, the river rolled down a red earth, which tinged its waters, deemed to be his wound bleeding afresh. In the Phcenician language Adan signifies a willow, and Adon lord, with the same radical letters. Hence teares Adonis, Salignus, and Adonios, or Adonis, for Adon. Adonis's horti, are gardens beautifully arranged, but more adapted for pleasure than profit.

Adonis, Birds-eye, or Phasianus-eye: a genus of the polyandria order, belonging to the polygynia class of plants. It is allied with the Multiflorae, or 26th Nat. Order. The characters are: The calyx is a perianthium, consisting of five oblong concave leaves, somewhat coloured, and deciduous. The corolla has from five to fifteen oblong petals obtuse and glossy. The pistillum consists of very numerous, short, tabulated filaments; the antherae are oblong and intus-serrulata. The Acontium has a long, straight, pointed head; no o; li; the dimidiate acute and reticulata. There is no pericarpium; the receptacle is oblong and spiked. The seeds are numerous, irregular, angular, gibbous at the base, reticulate at the top, somewhat prominent, and awl-shaped.

Species. The most remarkable species are the following: 1. The annus, or common adonis, is a native of Kent, where it is found in great plenty in the fields sown with wheat. Its flowers are of a beautiful scarlet colour, and appear in the beginning of June; the seeds ripening in August and September. Great quantities of these flowers are sold in London, under the name of Red Morocco. 2. The calcis, or annual adonis, with yellow flowers, grows much taller than the first, has its leaves thinner set, and of a lighter colour. 3. The vermis, or perennial adonis, grows naturally on the mountains of Bohemia, Prussia, and other parts of Germany. It flowers the latter end of March, or beginning of April; the stalks rise about a foot and a half high; and when the roots are large, and have flower unremoverd for some years, they will put out a great number of stalks from each root; on the top of each of these grows one large yellow flower. 4. The acontium, is a native of Siberia and the Appenines. Culture. The first two species, being annual, must be propagated from seeds, which ought to be sown in autumn, soon after they are ripe, or they will be in danger of not growing up that year. They thrive best in a light soil. The third and fourth species are likewise to be propagated from seeds, which must be sown in autumn, or they seldom succeed. When the plants come up, they must be carefully kept clear of weeds; and in very dry weather their growth will be promoted by being now and then watered. They should remain in the place where they are sown till the second year; and be transplanted thence in autumn, to the place where they are to remain.

Adonists, a sect or party, among Divines and Critics, who maintain, that the Hebrew points ordinarily annexed to the consonants of the word Jehovah, are not the natural points belonging to that word, nor express the true pronunciation of it; but are the vowel-points, belonging to the words Adonai and Elohim, applied to the consonants of the ineffable name Jehovah; to warn the readers, that instead of the word Jehovah, which the Jews were forbid to pronounce, and the true pronunciation of which had been long unknown to them, they are always to read Adonai. They are opposed to Jehovah: of whom the principal are Drufuris, Capellus, Buexfor, Alting, and Reland, who has published a collection of their writings on this subject.

Adoptianism, in church history, a sect of ancient heretics, followers of Felix of Urgel, and Elipand of Toledo, who, towards the end of the eighth century, advanced the notion, that Jesus Christ, in his human nature, is the Son of God, not by nature, but by adoption. Adoption, an act by which any one takes another into his family, owns him for his son, and appoints him for his heir.

The custom of adoption was very common among the ancient Greeks and Romans: yet it was not practiced.
Adoption was a sort of imitation of nature, intended for the comfort of those who had no children; wherefore he that was to adopt was to have no children of his own, and to be past the age of getting any; nor were enunuchs allowed to adopt, as being under an actual impotency of begetting children: neither was it lawful for a young man to adopt an elder, because that would have been contrary to the order of nature; nay, it was even required that the person who adopted should be eighteen years older than his adopted son, that there might at least appear a probability of his being the natural father.

Among the Greeks it was called φιλότητα, filiation. It was allowed to such as had no issue of their own; excepting those who were not κοινογενείοι, their own near kinsmen, e.g. slaves, women, madmen, infants, or persons under twenty years of age; who being incapable of making wills, or managing their own estates, were not allowed to adopt heirs to them. foreigners being incapable of inheriting in Athens, if any such were adopted, it was necessary first to make them free of the city. The ceremony of adoption being over, the adopted had his name enrolled in the tribe and ward of the Lacedemonians, and was allowed to do, unless they had first begotten children, to bear the name of the person who had adopted them: thus providing against the ruin of families, which would otherwise have been extinguished by the defection of those who had been adopted to preserve them. If the children adopted happened to die without children, the inheritance could not be alienated from the family into which they had been adopted, but returned to the relations of the adopter. It should seem, that by the Athenian law, a person, after having adopted another, was not allowed to marry without permission from the magistrate: in effect, there were instances of persons, who being illused by their adoptive children, petitioned for such leave. However this be, it is certain some men married after they had adopted sons; in which case, if they begat legitimate children, their estates were equally shared between the begotten and adopted.

The Romans had two forms of adoption; one before the praetor; the other at an assembly of the people, in the times of the commonwealth, and afterwards by a referment of the emperor. In the former, the natural father addressed himself to the praetor, declaring that he emancipated his son, resigned all his authority over him, and contented he should be translated into the family of the adopter. The latter was practised, where the party to be adopted was already free; and this was called adrogation. The person adopted changed all his names; assuming the surname, name, and forename of the person who adopted him.

Adoption by baptism, is that spiritual affinity which is contracted by god-fathers and god-children, in the ceremony of baptism. This kind of adoption was introduced into the Greek church, and came afterwards into use among the ancient Franks, as appears by the Capitulums of Charlemagne.

In reality, the god-father was so far considered as adoptive father, that his god-children were supposed to be intitled to a share in the inheritance of his estate.

Adoption by marriage, is the taking the children of a wife or husband, by a former marriage, into the condition of proper or natural children; and admitting them to inherit on the same footing with those of the present marriage. This is a practice peculiar to the Germans; among whom, it is more particularly known by the name of einkindschaft; among their writers in Latin, by that of utroque parentum, or union of effects. But the more accurate writers observe, that this is no adoption. See AFFILIATION.

Adoption by testament, that performed by appointing a person heir by will, on condition of his assuming the name, arms, &c. of the adopter. Of which kind we meet with several instances in the Roman history.

Among the Turks, the ceremony of adoption is performed by obliging the person adopted to pass through the skirt of the adopter. Hence, among that people, to adopt, is expressed by the phrase, to draw another through my skirt. It is said, that something like this has also been observed among the Hebrews; where the prophet Elijah adopted Elisha for his son and successor, and communicated to him the gift of prophecy, by letting fall his cloak or mantle on him. But adoption, properly so called, does not appear to have been practised among the ancient Jews: Moses says nothing of it in his laws: and Jacob's adoption of his two grandsons, Ephraim and Manasseh, is not so properly an adoption, as a kind of substitution, whereby these two sons of Joseph were allotted an equal portion in Israel with his own sons.

Adoption is allowed, in theology, for a federal act of God's free grace; whereby those who are regenerated by faith, are admitted into his household, and intitled
ADOPTION is sometimes also used, in speaking of the admission of persons into certain hospitals, particularly that of Lyons; the administrators whereof have all the power and rights of parents over the children admitted.

ADOPTION is also used for the reception of a new academy into the body of an old one. — Thus the French academy of Marseilles was adopted by that of Paris; on which account we find a volume of speeches extant, made by several members of the academy of Marseilles, deputed to return thanks to that of Paris for the honour.

In a similar sense, adoption is also applied by the Greeks, to the admitting a monk, or brother, into a monastery of Mars. It is also used among Romans, for ordinarily they paid to their gods, taken chiefly from the Egyptians: — The ceremony of adoption among the Romans was thus: The emperor published adoptive books; and adds it to his other works. — M. Menage has published a book of eulogies, or Uber Adoptivus, which he calls Liber Adoptivus; an adoptive book; and adds it to his other works. — Heinus, and Furtenburg of Munster, have likewise published adoptive books.

In ecclesiastical writers we find adoptive women, or sisters, (adoptivae feminae, or forores, used by those mandmaids of the ancient clergy, otherwise called sub-intrudite.

Adoptive arma are those which a person enjoys by the gift or concession of another, and to which he was not otherwise entitled. They stand contradistinguished from arms of alliance.

We sometimes meet with adoptive hair, by way of opposition to natural hair: and adoptive gods, by way of contradistinguished to domestic ones. The Romans, notwithstanding the number of their domestic, had their adoptive gods, taken chiefly from the Egyptians: such were Isis, Osiris, Anubis, Apis, Harpocrates, and Canopus.

ADORATION, the act of rendering divine honours; or of addressing a being, as supposing it a god. The word is compounded of ad (to); and oris, "mouth," and literally signifies, to apply the hand to the mouth; Manum ad or admoventer, q.d. "to kiss the hand;" this being, in the eastern countries, one of the great marks of respect and subMission. — The Romans professed adoption at sacrifices, and other solemnities; in passing by temples, altars, groves, &c. at the sight of statues, images, or the like, whether of stone or wood, wherein any thing of divinity was supposed to reside. Usually there were images of the gods placed at the gates of cities, for those who went in or out, to pay their respects to. — The ceremony of adoption among the ancient Romans was thus: The devotee having his head covered, applied his right hand to his lips, the fore-finger resting on his thumb, which was erect, and thus bowing his head, turned himself round from left to right. The kiss thus given was called salutum labraturum; for ordinarily they were afraid to touch the images of their gods themselves with their profane lips. Sometimes, however, they would kiss their feet, or even knees, it being held an incivility to touch their mouths; so that the affair paused at some distance. Saturn, however, and Hercules, were adored with the beard bare; whence the worship of the last was called infiristum peregrinatum, and Hylas Grammat- 

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than with his head covered, turning himself round, and then falling on his face. Heliodorus restored the practice, and Alexander Severus again prohibited it. Diocletian redemanded it; and it was, in some measure, continued under the succeeding princes, even after the establishment of Christianity, as Constantine, Constantius, &c. It is particularly said of Diocletian, that he had gems fastened to his feet, that divine honours might be more willingly paid him, by killing his feet. The like usage was afterwards adopted by the popes, and is observed to this day. These prelates, finding a vehement disposition in the people to fall down before them and kiss their feet, procured crucifixes to be fastened on their gippers; by which stratagem, the adoration intended for the pope's person is supposed to be transferred to Christ. Divers acts of this adoration we find offered even by princes to the pope.

Adoration is also used for a method of elevating a pope. The election of popes is performed two ways; by adoration and by feruting. In election by adoration, the cardinals rush hastily, as if agitated by some spirit, to the adoration of some one among them, to proclaim him pope. When the election is carried by feruting, they do not adopt the new pope till he is placed on the altar.

Barbarous adoration is a term used, in the laws of King Canute, for that performed after the manner of the heathens who adored idols. The Romish church is charged with the adoration of saints, martyrs, images, crucifixes, relics, the virgin, and the host; all which by Protestantists are generally aggravated into idolatry, on a supposition, that the honour thus paid to them is absolute and supreme, called by way of distinction Latria, which is due only to God. Roman catholics, on the contrary, explain them as only a relative or subordinate worship, called Dulia and Hyperdulia, which terminates ultimately in God alone. But may not the fame be paid of the idol-worship of the heathens? The Phecinians adored the winds, on account of the terrible effects produced by them; the same was adopted by most of the other nations, Persians, Greeks, Romans, &c. The Persians chiefly paid their adorations to the sun and fire; some pay also to rivers, the wind, &c. The motive of adoring the sun was the benefits they received from that glorious luminary, which of all creatures has doubtless the best pretensions to such high regard.

Adorea, in Roman antiquity, a word used in different senses; sometimes for all manner of grain, sometimes for a kind of cakes made of fine flour, and offered in sacrifice; and finally for a dole or distribution of corn, as a reward for some service; whence by metonymy it is put for praife or rewards in general.

Adosculatio, a term used by Dr Grew, to imply a kind of impregnation, without intromission; and in this manner he supposes the impregnation of plants is affected by the falling of the farina on the pistil.

Adosee, in heraldry, signifies two figures or bearings being placed back to back.

Adour, the name of a river in France, which rises in the mountains of Bigorre, and running N. by Tarbes through Gascony, afterwards turns E., and, passing by Dax, falls into the bay of Biscey, below Bayonne.

Adoxa, Tuberous MoschateL, Hollow-root, Incongruous; a genus of the tetragnia or. Order, belonging to the octandra class of plants. In the natural method it belongs to the 13th order, or Succulents.—The characters of this genus are: The calyx is a perianthium beneath, divided into two segments, flat, perifent. The corolla is composed of one flat petal, divided into four ovate acute segments longer than the calyx. The flaminia consists of eight subulate filaments the length of the calyx; with roundish antherae. The pistillum has a germin beneath the receptacle of the corolla; four simple, erect, perifent styli, the length of the flaminia; and simple stigma. The pericarpium is a globular four-celled berry between the calyx and the corolla. The seeds are foliary and compressed.

There is but one species, which is a native of the woods in Britain, and several parts of Europe: it is a very low plant, seldom rising more than four or five inches high; the leaves resemble those of bulbous omitory; the flower-stalk arises immediately from the root, on the top of which grow four or five small flowers of an herbaceous white colour; which appear in the beginning of April, and the berries ripen in May, soon after which, the leaves decay. The herb may be procured by transplanting the roots any time after the leaves decay, till winter. They must be planted in the shade, under shrubs; for they will not thrive if exposed to the sun. The leaves and flowers smell like musk, from whence it has by some been called musk-crowfoot.

Adounus omnium, among physicians, on a prescription in their prescriptions, signifying that the last mentioned ingredient is to weigh as much as all the rest together.

Ad Quod Damnun, in the English law, a writ directed to the sheriff, commanding him to inquire into the damage which may befall from granting certain privileges to a place, as a fair, a market, or the like.

Adrachne, in botany, a species of the strawberry-tree. See Arbutus.

Adramelech, one of the gods of the inhabitants of Sepharvaim, who were settled in the country of Samaria, in the room of those Israelites who were carried beyond the Euphrates. The Sepharvaites made their children pass through the fire, in honour of this idol and another called Anamelch. It is suppofed, that Adramelech meant the sun, and Anamelch the moon: the first signifies the magnificent king; the second the gentle king.

Adramyttium (anc. geog.), now Adramiti; a town of Myfia Major, at the foot of mount Ida, an Athenian colony, with a harbour and dock near the Caicus. Adramyttius the epithet; as Adramyttius Sinus, a part of the Egean Sea, on the coast of Myfia; Adramyttius Commenus, feilions affiles. The eighth in order of the nine Conventus Juridici of the province of Alia.

Adran, a river of Germany, (Polybius); now the Eder, rising on the borders of the county of Nassau, to the North-east of, and not far from Dillenburg, running through the landgrave of Halle, the county of Waldeck, by Fritzlar, and then again through the landgrave's, and, together with the Fulda, falling into the Weser, to the south of, and not far from Caffel.

Adranum, or Hadranum, (anc. geog.), now Aderno; a town of Sicily, built by the elder Dionysius,
ADRASTEA, in antiquity, an epithet given to the goddess Nemesis, or Revenge. It was taken from king Adræus, who first erected a temple to that deity.

ADRASTIA (Gorgoneia), in antiquity, a kind of Pythian games, instituted by Adræus, king of Argos, in the year of the world 2700, in honour of Apollo, at Sicyon. These are to be distinguished from the Pythian games celebrated at Delphi.

ADRASTUS, king of Argos, son of Talaus and Lybia, daughter of Polybius, king of Sicyon, acquired great honour in the famous war of Thebes, in support of Polynices his son-in-law, who had been excluded the sovereignty of Thebes by Eteocles his brother, notwithstanding their reciprocal agreement. Adræus, followed by Polynices and Tydeus his other son-in-law, by Cephenus and Hippomenon his foster's sons, by Amphiarus his brother-in-law, and by Parnassus, marched against the city of Thebes; and this is the expedition of the Seven Worthies, which the poets have so often sung. They all lost their lives in this war, except Adræus, who was saved by his horse called Arion. This war was revived ten years after by the sons of these deified warriors, which was called the war of the Epigonés, and ended with the taking of Thebes. None of them lost their lives except Egealus son of Adræus; which afflicted him so much that he died of grief in Megara, as he was leading back his victorious army.

ADRAZZO, or AJACCIO. The name with Adræus.

ADRIA, or HADRIEN (anc. geog.), the name of two towns in Italy. One in the country of the Veneti, on the river Tartarus, between the Padus and the Athris, called Aricia by Pliny and Prolemy, but Adria by Strabo. Another on the river Vomanaus, in the territory of the Piceni, (to which Antonine's Itinerary from Rome is directed,) the country of the ancestors of the emperor Adrian. From which of these the Adriatic sea is denominated, is matter of doubt. A third opinion is, that it is so called from Adrias the son of Joan, of Italian origin; (Bukathias in Dionysius.)

ADRIAN (or ADRIATICUM) MARE (anc. geog.), now the gulf of Venice, a large bay in the Mediterranean, between Dalmatia, Scilavonia, Greece, and Italy. It is called by the Greeks, Adriatic Ocean; and Adriaco by the Romans, (as Arbitre, Adria Notus, Hor.) Cicero calls it Hadrianum Mare; Virgil has Hadriaticas Undas. It is commonly called Mare Adriaticum, without an aspiration; but whether it ought to have one, is a dispute: if the appellation is from Hadria, the town of the Piceni, it must be written Hadriaticum, because the emperor's name, which thence derives his origin, is on coins and stones Hadriaticus; but if it from the town in the territory of Venice, as the more ancient, and of which that of the Piceni is a colony, this will justify the common appellation Adriaticum.

ADRIAN, or HADRIAN, (Publius Aelius), the Roman emperor. He was born at Rome, the 24th of January, in the 76th year of Christ. His father left him an orphan, at ten years of age, under the guardianship of Trajan, and Ecelus Attianus a Roman knight. He began to serve very early in the armies, having been tribune of a legion before the death of Domitian. He was the person chosen by the army of Lower Media, to carry the news of Nerva's death to Trajan, successor to the empire. He accompanied Trajan in most of his expeditions, and particularly distinguished himself in the second war against the Daci; and having before been quaestor, as well as tribune of the people, he was now successively praetor, governor of Pannonia, and consul. After the siege of Atra in Arabia was raised, Trajan, who had already given him the government of Syria, left him the command of the army; and at length, when he found death approaching, it is said he adopted him. Adrian, who was then in Antiochia, as soon as he received the news thereof, and of Trajan's death, declared himself emperor, on the 11th of August, 117. No sooner had he arrived at the imperial dignity, than he made peace with the Persians, to whom he yielded up a great part of the conquests of his predecessors; and from generosity, or policy, he remitted the debts of the Roman people, which, according to the calculation of those who have reduced them to modern money, amounted to 22,500,000 gold crowns; and he burnt all the bonds and obligations relating to those debts, that the people might be under no apprehensions of being called to an account for them afterwards. There are medals in commemoration of this fact, in which he is represented holding a flambeau in his hand, to set fire to all those bonds which he had made void. He went to visit all the provinces; and did not return to Rome till the year 118, when the senate decreed him a triumph, and honoured him with the title of Father of his country; but he refused both, and desired that Trajan's image might triumph. No prince travelled more than Adrian; there being hardly one province in the empire which he did not visit. In 120 he went into Gaul; from thence he went over to Britain, in order to subdue the Caledonians, who were making continual inroads into the provinces. Upon his arrival they retired towards the north: he advanced however as far as York, where he was diverted from his intended conquest by the description some old soldiers he found there, who had served under Agricola, gave him of the country. In hopes, therefore, of keeping them quiet by enlarging their bounds, he delivered up to the Caledonians all the lands lying between the two Fritias and the Tyne; and at the same time, to secure the Roman provinces from their future incursions, built the famous wall which still bears his name (A). Having thus settled...
Adrian was honoured with the title of Reformer of Britain, as appears by some medals. He soon after went into Spain, to Mauritania, and at length into the East, where he quitted the communities held by the Parthians. After having visited all the provinces of Asia, he returned to Athens in 127, where he passed the winter, and was initiated in the mysteries of Eleusinian Ceres. He went from thence to Sicily, chiefly to view Mount Aetna, contemplate its phenomena, and enjoy the beautiful and extensive prospect afforded from its top. He returned to Rome the beginning of the year 129; and, according to some, he went again, the same year, to Africa; and, after his return from thence, to the East. He was in Egypt in the year 132, revisited Syria the year following, returned to Athens in 134, and to Rome in 135. The persecution against the Christians was very violent under his reign; but it was at length suspended, in consequence of the remonstrances of Quadrat bishop of Athens, and Ariatides, two Christian philosophers, who represented the emperor with some books in favour of the Christian religion. He conquered the Jews; and, by way of insult, erected a temple to Jupiter on Calvary, and placed a statue of Adonis in the manger of Bethlehem; he caused also the images of swine to be engraven on the gates of Jerusalem. At last he was seized with a droopy, which vexed him to such a degree, that he became almost raving mad. A great number of physicians were sent for, and to the multitude of them he ascribed his death. He died at Baia in the 69th year of his age, having reigned 21 years. The Latin verses (A) he addressed to his soul have been much criticized and variously interpreted. There are some fragments of his Latin poems extant, and there are Greek verses of his in the Anthology. He also wrote the history of his own life: to which, however, he did not chuse to put his name; but that of Phegon, one of his freed-men, a very learned person, was prefixed to it. He had great wit, and an extensive memory. He understood the sciences perfectly well; but he was very jealous of others who excelled in them. He was also cruel, envious, and lascivious. Antoninus his predecessor obtained his apotheosis; and prevented the reflection of his acts, which the senate once intended.

ADRIAN IV. (Pope), the only Englishman who had the honour of sitting in the papal chair. His name was Nicholas Brekefere; and he was born at Langley, near St Alban's, in Hertfordshire. His father having left his family, and taken the habit of the monastery of St Alban's, Nicholas was obliged to submit to the lowest offices in that house for daily support. After some time, he desired to take the habit in that monastery, but was rejected by the abbot Richard. Upon this he resolved to try his fortune in another country, and accordingly went to Paris; where, though in very poor circumstances, he applied himself to his studies with great industry, and made a wonderful proficiency. But having still a strong inclination to a religious life, he left Paris, and removed to Provence, where he became a regular clerk in the monastery of St Rufus. He was not immediately allowed to take the habit; but passed some time, by way of trial, in recommending himself to the monks by a strict attention to all their commands. This behaviour, together with the beauty of his person, and prudent conversation, rendered him so acceptable to those religious, that after some time they intreated him to take the habit of the canonical order. Here he distinguished himself so much by his learning and strict observance of the monastic discipline, that, upon the death of the abbot, he was chosen superior of that house; and we are told that he rebuilt that convent. Pope Eugenius III. being apprised of the great merit of Nicholas, and thinking he might be serviceable to the church in a higher station, created him cardinal-bishop of Alba in 1146. In 1148, his Holiness sent him legate to Denmark and Norway; where, by his fervent preaching and diligent instructions, he converted those barbarous nations to the Christian faith; and erected Up

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4 Vide Sermon, in Adr- 

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the town of Newcastle now stands; so that it must have been above 60 English, and near 70 Roman miles in length. It consisted of four parts: 1. The principal agger, mound of earth, or rampart, on the brink of the ditch. 2. The ditch on the north side of the rampart. 3. Another rampart on the south side of the principal one, about five paces distant from it. 4. A large rampart on the north side of the ditch. This last was probably the military way to the line of forts on this work: it was so to those formerly built by Agricola; and if it did not serve the same purpose in this, there must have been no military way attending it. — The south rampart might serve for an inner defence in case the enemy should beat them from any part of the principal rampart, or it might be designed to protect the soldiers from any sudden attack of the provincial Britons. — For many ages, this work hath been in so ruinous a condition, that it is impossible to discover its original dimensions with certainty. From their appearance, it seems probable that the principal rampart was at least 10 or 12 feet high, and the south one not much lefs; but the north one was considerably lower. From the dimensions of the ditch taken as it passes through a lime-flone quarry near Harlow-hill, it appears to have been 9 feet deep, and 11 wide at the top, but somewhat narrower at the bottom. The north rampart was about 20 feet distant from the ditch.

(A) The verses are these:

Animula vagula, blandula,
Hospes, consilium corporis,
Quae nunc, abhis in loca
Pallidula, rigida, nudula,
Nec ut foles, dasbis jocos?

Thus translated by Mr Pope:

Ah! fleeting spirit! wandering fire,
That long had warm'd my tender breast,
Must thou so more this transing fire?

No more a pleasing cheerful guest?
Whither, ah whither art thou flying?
To what dark unlook'd for shore?

Thou seem'st all trembling, shivering, dying.

And wit and humour are no more!
Romulus, he was received by the pope and cardinals with great marks of honour; and Pope Anastasius, who succeeded Eugenius, happening to die at this time, Nicholas was unanimously chosen to the holy see, in November 1554, and he took the name of Adrian. When the news of his promotion reached England, King Henry II. sent Robert abbot of St Albans', and three bishops, to Rome, to congratulate him on his election; upon which occasion Adrian granted very considerable privileges to the monastery of St Albans, particularly an exemption from all episcopal jurisdiction, excepting to the fee of Rome. Adrian, in the beginning of his pontificate, boldly withstood the attempts of the Roman people to recover their ancient liberty under the confuls, and obliged those magistrates to abdicate their authority, and leave the government of the city to the pope. In 1555, he drove the heretic Arnaud de Brete, and his followers, out of Rome. The fame year he communicated William, king of Sicily whorsaged the territories of the church, and abdolicted that prince's subjedts from their allegiance. About the fame time, Frederic king of the Romans, having entered Italy with a powerful army, Adrian met him near Sutriam, and concluded a peace with him. At this interview, Frederic confented to hold the pope's right whilst he mounted on horseback. After which, his holiness conducted that prince to Rome, and in St Peter's church placed the imperial crown on his head, to the great mortification of the people of Rome. Then next year a reconciliation was brought about between the pope and the Sicilian king, that prince taking an oath and profession of obedience. At this interview, Frederic conformed to the pope and the Sicilian king, that prince taking an oath and profession of obedience.

After this, his holiness proceeded to hold a council at Mantua, with a powerful army, and in every thing he showed a great dislike for all of his followers, out of date. He was very partial to his own countryman John of Corneto, his father was not able to maintain him at school, but he got a place at Louvain, in a college in which a certain number of scholars were maintained gratis. It is reported that he ufed to read in the night-time by the light of the lamps in the churches or streets. He made a considerable progress in all the sciences; led an exemplary life; and there never was a man less intriguing and forward than he was. He took his degree of doctor of divinity at Louvain; was soon after made canon of St Peters, and professor of divinity at Utrecht, and then dean of St Peters and vice-chancellor of the university. He was obliged to leave an academic life, to be tutor to the archduke Charles. This young prince made no great progress under him: however, never was a tutor more considerately rewarded; for it was by Charles V.'s credit he was raised to the papal throne. Leo X. had given him the cardinal's hat in 1517. After this pope's death, several cabals in the conclave ended in the election of Adrian, with which the people of Rome were very much displeased. He would not change his name, and in every thing he showed a great dislike for all inconvenient and f념ial pleasures, though such an aversion had been long ago out of date. He was very partial to Charles V. and did not enjoy much tranquillity under the triple crown. He lamented much the wicked morals of the clergy, and wished to establish a reformation of manners among them. He died Sept. 14. 1523.

ADRIANI (Joanni Batista), was born of a patrician family at Florence, in 1511. He wrote a History of his own Times in Italian; which is a continuation of Guicciardini, beginning at the year 1536; to which Thanatus acknowledges himself greatly indebted: besides which, he compiled six funeral orations, on the emperor Charles V. and other noble personages; and is thought to have been the author of a long letter on ancient painters and sculptors, prefixed to the third volume of Vafari. He died at Florence in 1579.

ADRIANISTS, in ecclesiastical history, a sect of heretics divided into two branches; the first were disciples of Simon Magus, and flourished about the year 34. Theodoret is the only person who has preserved their name and memory; but he gives us no account of their origin. Probably this sect, and the six others which sprang from the Simonians, took their name from the particular disciples of Simon. The second were the followers of Adrian Hamstead, the anabaptists; and held some particular errors concerning Christ.

ADRIANOPELE, a city of Turkey in Europe, in the province of Romania, and the see of an archbishop under the patriarch of Constantinople. It is about seven or eight miles in circumference, including the old city and some gardens. The mosques and other public buildings are built of stone, and are very elegant; but...
Advanced Guard, or Vanguiard, in the art of war, the first line or division of an army, ranged or marshaling in order of battle or, it is that part which is next the enemy, and marches first towards them.

Advanced Guard, is more particularly used for a small party of horse stationed before the main-guard.

ADVANCER, among sportsmen, one of the flarts or branches of a buck's antler, between the back antler and the palm.

ADUAR, in the Arabian and Moorish customs, a kind of ambulatory village, consisting of tents, which these people remove from one place to another, as suits their convenience.

ADVENT, in the calendar, properly signifies the approach of the feast of the nativity. It includes four Sundays, which begin on St Andrew's day, or on the Sunday before or after it. During advent, and to the end of the octaves of epiphany, the solemnizing of marriage is forbidden without a special licence. It is appointed to employ the thoughts of Christians on the first advent or coming of Christ in the flesh, and his second advent or coming to judge the world. The primitive Christians practiced great austerity during this season.

ADVENTURÉ, in a general sense, some extraordinary or accidental event. It also denotes a hazardous or difficult undertaking.

Bill of Adventure, among merchants, a writing signed by a merchant, testifying the goods mentioned in it to be shipped on board a certain vessel belonging to another person, who is to run all hazards; the merchant only obliging himself to account to him for the produce.

ADVENTURE-Bay, in Van Diemen's land. There is a beautiful sandy beach, about two miles long, at the point of the bottom of Adventure Bay, formed to all appearance, by the particles which the sea washes from a fine white sandstone. This beach is very well adapted for hauling a seine. Behind it is a plain, with a brackish lake, out of which we caught, by angling, some bream and trout. The parts adjoining the bay are mostly hilly, and are an entire forest of tall trees, rendered almost impassable by breaks of fern, shrubs, &c. The soil on the flat land, and on the lower part of the hills, is sandy, or consists of a yellow with earth, and in some parts of a reddish clay; but further up the hills, it is of a grey tough clay. This country, upon the whole, bears many marks of being very dry, and the heat appears to be great. No mineral soil, nor stones of any other kind but the white sandstone, were observed by us; nor could we find any vegetables that afforded subsistence for man. The forest-trees are all of one kind, and generally quite straight; they bear clusters of small white flowers. The principal plants observed, are wood-forrel, milk-wort, cudweed, bell-flower, gladioris, falphaire, and several kinds of fern: the only quadruped, a species of opossum, about twice the size of a large rat. The kangaroo, found further northward in New Holland, may also be supposed to inhabit there, as some of the inhabitants had pieces of the skin of that animal.
ADVERTISER, in antiquity, a servant who attended the rich in returning from foppers, to give them notice of any obstacles in the way, at which they might be apt to stumble.

ADVERTISEMENT, in a general sense, denotes any information given to persons interested in an affair; and is more particularly used for a brief account of an affair inserted in the public papers, for the information of all concerned.

ADULA (anc. geog.), a mountain in Phœnicia, or the country of the Cilions, part of the Alps, in which are the fountains of the Rhine, now St Godahard.

ADULE, or ADULIS, (anc. geog.) a town of Egypt built by fugitive slaves, distant from its port on the Red Sea 25 stadia. Pliny calls the inhabitants Aduliacs. The epithet is either Adulianus; as, Monumentum Adulianum, on the pompous inscription of the statue of Ptolemy Euergetes, published by Leo Alatus at Rome in 1631, and to be found in Spot and Thevenot: Or, Adulius; as Adulius Sinus, a part of the Red Sea.

ADULT, an appellation given to any thing that is arrived at maturity: Thus we say, an adult person, an adult plant, &c. Among civilians, it denotes a youth between 14 and 25 years of age.

ADULTERER, a man who commits adultery. See ADULTERY.

ADULTRESS, a woman guilty of ADULTERY. An adulterer, by the English law, undergoes no temporal punishment whatever, except the loss of her dower; and she does not lose even that, if her husband is weak enough to be reconciled to her, and cohabit with her after the offence committed. 13 Ed. I. cap. 34.

But it is to be observed, that adulteresses are fequefterd either by the canon or civil law. According to the former, a woman is an adulteress who, either being herself married, converses carnally with another man; or being single herself, converses with a man that is married. According to the latter, she is not an adulteress, if she be not herself in the married state, though she converses with a man that is. The crime, in this case, was more properly called superstruens than adulterium. Hence, among the Romans, the word adultereia "a-dulteries," differed from pellex, which denoted a single woman who cohabited with a married man, and pellex differed from concludens which signified her who had only intercourse with an unmarried man. The former was repelled infamously, and the latter innocent.

ADULTERATION, the act of debaseing, by an improper mixture, something that was pure and genuine.

The word is Latin, formed of the verb adultereare, "to corrupt," by mingling something foreign to any substance. There are in England laws against the adulteration of coffee, tea, tobacco, fluff, wine, beer, bread, wax, hair-powder, &c.

ADULTERATION OF COIN, properly imports the making, or casting of a wrong metal, or with too base or too much alloy.

Adulterations of coins are effected divers ways: as, by forging another stamp or inscription; by mixing impure metals with the gold or silver: most properly, by making use of a wrong metal, or an undue alloy, or too great an admixture of the bater metals with gold or silver. Counterfeiting the flamp, or clipping and...
ADULTERINE and lenifying the weight, donot inproperly come under
ADULTERY. the denomination of adulterating.—Evelyn gives rules and
methods, both of adulterating and detecting adulterated metals, &c.
Adulterating is somewhat less extensive than debasing, which includes diminishing, clipping, &c.
To adulterate or debase the current coin, is a capital crime in all nations.—The ancients punished it with
great severity: among the Egyptians both hands were
cut off; and by the civil law, the offender was thrown to
wild beasts. The emperor Titus enacted, that
counterfeiting the coin should be capital; and under
Constantine it was made treason, as it is also among us.
The adulterating of gems is a curious art, and the
methods of detecting it are lesuseful. Nichols Lapid. p. 18.

ADULTERINE, in the civil law, is particularly
excepted from the crime of adulterating a married person and another, or between a married and
an unmarried person. This was an awkward form of
impalement, permitted only to take her back again; if he refused,
not receive alms among the
Greeks. Adulterous children are more odious than
the illegitimate offspring of single perfons. The
Romans had a particular law in favour of the wife, who
was permitted to kill both parties, when
caught in the fact, provided he did it immediately, killed both together, and as it were with one blow. The
same power ordinarily was not indulged the husband, but rather banishment, or deportation, being interdicted fire and water; though Octavius,
appears, in several instances, to have gone beyond his own law, and to have put adulterers to death. Under
Macrinus, many were burnt at a stake. Constantine
first law made the crime capital. Under Constan-
tius and Constans, adulterers were burnt, or fewed in
sacks and thrown into the sea. Under Leo and Mar-
cian, the penalty was abated to perpetual banishment,
or cutting off the nose. Under Justinian, a further
mitigation was granted, at least in favour of the wife, who
was only to be scourged, lofe her dowery, and be
shut up in a monastery: after two years, the husband was at liberty
to take her back again; if he refused, she was shaven,
and made a nun for life: But it still remained death
for the husband. The reason alleged for this difference
is, that the woman is the weaker vessel. Mathæus de-
claims against the empress Theodora, who is supposed
to have been the caufe of this law, as well as of others
procured in favour of that sex from the emperor.
Under Theodosius, women convicted of this crime
were punished after a very singular manner, viz. by a
public confuption; being locked up in a narrow cell,
and forced to admit to their embraces all the men that
would offer themselves. To this end the gallants were
to drefs themselves on purpose, having several little bells
fastened to their clothes, the tinkling of which
gave notice to those without of every motion. The
custom was again abolished by the future emperors.

By the Jewish law, adultery was punished by death
in both parties, where they were both married, or only
the woman. The Jews had a particular method of
trying, or rather purging, an adulterer, or a woman
fufpected of the crime, by making her drink the bitter waters of jealousy; which, if she were guilty, made
her swell.

Among the Mingrelians, according to Chardin, ad-
ultery is punished with the forfeiture of a hog, which
is usually eaten in good friendship between the gallant,
the adulterers, and the cuckold. In some parts of the
Indies, it is said any man's wife is permitted to pro-
stitute herself to him who will give an elephant for the
use of her; and it is reputed no small glory to her to
have
Adultery have been rated so high. Adultery is said to be so frequent at Ceylon, that not a woman but practises it, notwithstanding its being punishable with death. Among the Japanese, and divers other nations, adultery is only penal in the woman. Among the Abyssinians, the crime of the husband is said to be only punished on the innocent wife. In the Marian islands, on the contrary, the woman is not punishable for adultery: but if the man go astray he pays severally: the wife and her relations waste his lands, turn him out of his house, &c. Among the Chinese, there is reason to conclude that adultery is not capital; for it is said that fond parents will make a contract for their daughters future husbands to allow them the indulgence of a gallant.

In Spain, they punished adultery in men by cutting off that part which had been the instrument of the crime. In Poland, before Christianity was established, they punished adultery and fornication in a very particular manner: the criminal they carried to the market-place, and there fastened him by the testicles with a nail; laying a razor within his reach, and leaving him under the necessity, either of doing justice upon himself or of perishing in that condition.

The Saxons formerly burnt the adulterers, and over her affes erected a gibbet, whereon the adulterer was hanged. In England, likewise, adultery, by the ancient laws, was severely punished. King Edmund of the Saxons ordered adultery to be punished in the same manner as homicide; and Canute the Dane ordered that a man who committed adultery should be banished, and that the woman should have her nose and ears cut off. In the time of Henry I. it was punished with the loss of eyes and genitals.

In Britain, adultery is reckoned a spiritual offence, that is, cognizable by the spiritual courts, where it is punished by fine and penance. The common law takes no further notice of it, than to allow the party guilty of an action and damages. This practice is often cen sured by foreigners, as making too light of a crime, the bad consequences of which, public as well as private, are so great. It has been answered, that perhaps this penalty, by civil action, is more wisely calculated to prevent the frequency of the offence, which ought to be the end of all laws, than a severer punishment. He that by a judgment of law is, according to circumstances, stripped of great part of his fortune, thrown into prison till he can pay it, or forced to fly his country, will, no doubt, in most cases, own that he pays dearly for his amiss.

As to the moral turpitude of this offence, some have mainly endeavoured to deny or explain it away by various arguments, and even by an appeal to scripture. On the part of the man who solicits the chastity of a married woman, it certainly includes the crime of seduction, and is attended with mischief still more complicated and extensive. It creates a new sufferer, the injured husband, upon whose simplicity and affection is inflicted a wound the most painful and inexcusable that human nature knows. The infidelity of the woman is aggravated by cruelty to her children, who are generally involved in their parents flame, and always made unhappy by their quarrel.

It has been argued, that these consequences ought to be attributed to the crime than to the discovery. But, in the first place, the crime could not be discovered unless it were committed, and the commission is never secure from discovery. 

The marriage-vow is "witnessed before God," and accompanied with circumstances of solemnity and religion which approach to the nature of an oath. The married offender, therefore, incurs a crime little short of perjury, and the seduction of a married woman is little less than subornation of perjury:—and this guilt is independent of the discovery.

But the usual apology for adultery is the prior transgression of the other party; and so far, indeed, as the bad effects of adultery are anticipated by the conduct of the husband or wife who offends first, the guilt of the second offender is extenuated. But this can never amount to a justification; unless it could be shown that the obligation of the marriage-vow depends upon the condition of reciprocal fidelity; a construction which appears founded neither in expediency, nor in the terms of the vow, nor in the design of the legislature which prescribed the marriage-rite. The way of considering the offence upon the footing of "prosecution and retaliation," is a childish trifling with words.

"Thou shalt not commit adultery," was an interdict delivered by God himself; yet scripture has been adduced as giving countenance to the crime. As Christ told the woman taken in adultery, "Neither do I condemn thee," we must believe, it is said, that he deemed her conduct either not criminal, or at least not a crime of the heinous nature we represent it to be. But from a more attentive examination of the case, it will be evident that nothing can be concluded from it favourable to such an opinion. The transaction is thus related: "Early in the morning Jesus came again into the temple, and all the people came unto him; and he sat down and taught them; and the scribes and Pharisees brought unto him a woman taken in adultery; and when they had set her in the midst, they said unto him, Master, this woman was taken in adultery; and in the law which Moses in the law commanded that such should be stoned, but what sayest thou? This they said tempting him, that they might have to accuse him: but Jesus stooped down, and with his finger wrote on the ground as though he heard them not. So when they continued asking him, he lift up himself, and said unto them, He that is without sin among you, let him first cast a stone at her; and again he stooped down and wrote on the ground; and they which heard it, being convicted by their own conscience, went out one by one, beginning at the eldest, even unto the last; and Jesus was left alone, and the woman standing in the midst. When Jesus had lifted up himself, and saw none but the woman, he said unto her, Woman, where are those thine accusers? Hath no man condemned thee? She said unto him, No man, Lord: and he said unto her, Neither do I condemn thee; go and sin no more."
This they said tempting him, that they might have to accuse him; that is, to draw him into an exercise of judicial authority, that they might have the power to accuse him before the Roman governor of usurping or intermeddling with the civil government.

This was their design; and Christ's behaviour throughout the whole affair proceeded from a knowledge of this design, and a determination to defeat it. He gives them at first a cold and full denial, well suited to the insidious intention with which they came: he stooped down, and with his finger wrote on the ground as though he heard them not.

When they continued asking him, when they teased him to speak, he dismissed them with a rebuke, without reproving them, with the reproof, to speak, he dismissed them with a rebuke.

Neither do I condemn thee; go and sin no more. And then follows the conversation, which is the part of the narrative most material to our present subject. Jesus saith unto her, Woman, where are those that accused thee? hath no man condemned thee?

She said, No man, Lord. And Jesus said unto her, Neither do I condemn thee: go and sin no more.

Now, when Christ asked the woman, Hath no man condemned thee? he certainly spoke, and was understood by the woman to speak, of a legal and judicial condemnation; otherwise her answer, No man, Lord, was not true. In every other sense of condemnation, as blame, cenfure, reproof, private, judgment, and the like, many had condemned her; all these, indeed, who brought her to Jesus. If then a judicial sentence was what Christ meant by condemning in the question, the common use of language requires us to suppose that he meant the same in his reply, Neither do I condemn thee: i.e. I pretend to no judicial character or authority over thee; it is no office or business of mine to pronounce or execute the sentence of the law. When Christ adds, Go and sin no more, the effect of that sentence is to inform her that she had sinned already; but as to the degree or quality of the sin, or Christ's opinion concerning it, nothing is declared, or can be inferred, either way.

It has been controverted, whether adultery may be lawfully committed in war, with the enemies wives? The answer is in the negative, and the authorized practice of civilized nations is agreeable to this. It has also been a famous question, whether it be lawful for a woman to commit adultery with the consent of her husband, and for the procuring some good great to him? St. Austin apparently allows of it; at least does not condemn it.

It has likewise been a dispute, whether it be lawful for one of the parties married to commit adultery, with the consent of the other, for the sake of having children? of which we have instances in Abraham, who, on this account, converted with Hagar; and likewise among the Greeks and Romans. Pollian, a German professor, has a dissertation on the husband's right to alienate his wife's body to another's use.

It is much disputed whether adultery dissolves the bond of matrimony, and be a sufficient cause of divorce, so that the parties may marry again. This was allowed in the ancient church, and is still continued in the Greek, as well as the Lutherans and Calvinists in the churches. Romanists, however, dissent from it, and the council of Trent even anathematized those who maintain it: though the canon of anathematization was mitigated in deference to the republic of Venice, in foon of whose dominions, as Zant, Cephalonia, &c., the contrary usage obtains. These ecclesiastical courts in England do agree with those of Rome, that they only grant a divorce à mensa et thoro, in case of adultery; so that a complete divorce, to enable the parties to marry again, cannot be had without an act of parliament.

Adultery is also used in ancient customs, for the punishment or fine imposed for that offence, or the privilege of prosecuting for it. In which sense adultery amounts to the same with what the Saxons call legerus.

Adultery is sometimes used in a more extensive sense, for any species of impurity or crime, against the virtue of chastity; and in this sense divines understand the seventh commandment.

Adultery is also used, especially in scripture, for idolatry, or departing from the true God, to the worship of a false one.

Adultery is also used, in ecclesiastical writers, for a pernicious invading or intruding into a bishop's diocese during the former bishop's life. The reason of the appellation, that a bishop is supposed to exact a kind of spiritual marriage with his church. The translation of a bishop from one see to another was also reputed a species of adultery on the supposition of its being a kind of second marriage, which, in those days, was esteemed a degree of adultery. This conclusion was founded on that text of St. Paul, Let a bishop be the husband of one wife, by a forced contraction of church for wife, and bishop for husband. Di-Cange.

Adultery is also used, in ancient naturalists, for the act of ingrafting one plant upon another. In which sense, Pliny speaks of the adulteries of trees, arborum adulteria, which he represents as contrary to nature, and a piece of luxury, or needless refinement.

Advocate, among the Romans, a person skilled in their law, who undertook the defence of causes at the bar. The Roman advocates answered to one part of the office of a barrister in England, viz. the pleading part; for they never gave council, that being the business of the turfes. The Romans, in the first ages of their state, held the profession of an advocate in great honour; and the fees of their bar were crowded with senatoris and confuls; they, whose voices commanded the people, thinking it an honour to be employed in defending them. They were styled comites, honorati, clarissimi, and even patroni; as if their clients were not left obliged to them than freed men to their masters. The bar was not at that time venal. Those who afforded to honours and offices took this way of gaining an interest in the people, and always pleaded gratis. But no sooner were luxury and corruption introduced into the commonwealth, than the senators became a dars in them. Then it was the senators let out their voices for pay, and zeal and eloquence were sold to the highest bidder. To put a stop to this abuse, the
Ad
defendants.

Advocates} tribune Cinigas procured a law to be passed, called from him Lex Cinius, whereby the advocates were forbidden to take any money of their clients. It had before this been prohibited the advocates to take any presents or gratuities for their pleading. The emperor Augustus added a penalty to it: notwithstanding which, the advocates played their part so well, that the emperor Claudius thought it an extraordinary circumstance, when he obliged them not to take above eight great fereces, which are equivalent to about 641 Sterling, for pleading each cause.

Advocates} are still used, in countries and courts where the civil law obtains, for those who plead and defend the cause of clients trusted to them.

Advocates} of a City, in the German polity, a magistrate appointed in the emperor's name to administer justice.

Advocates} is more particularly used, in church history, for a person appointed to defend the rights and revenues of a church or religious house. The word 

Advocatus, or 

Advovus, is still retained for what we usually call the patron, or he who has the advowson, or right of presentation, in his own name.

Confessional Advocates; officers of the confistory at Rome, who plead in all oppositions to the disposal of benefices in that court: they are ten in number.

Elective Advocates, those chosen by the abbot, bishop, or chapter; a particular licence being had from the king, or prince, for that purpose. The elections were originally made in the presence of the count of the province.

Feudal Advocates. These were of the military kind, who, to make them more zealous for the interest of the church, had lands granted them in fee, which they held of the church, and did homage, and took an oath of fidelity to the bishop or abbot. These were to lead the vassals of the church to war, not only in private quarrels of the church itself, but in military expeditions for the King's service, in which they were the standard-bearers of their churches.

Fiscal Advocates, fiscal advocatus, in Roman antiquity, an officer of state under the Roman emperors, who pleaded in all causes wherein the fiscus, or private treasury, was concerned.

Juridical Advocates, in the middle age, were those who from attending causes in the court of the comice, or count of the province, became judges themselves, and held courts of their vassals thrice a-year, under the name of the tria placita generis. In consideration of this further service, they had a particular allowance of one third part of all fines, or mullets, imposed on defaulters, &c. besides a proportion of diet for themselves and servants.

Matricular Advocates, were the advocates of the mother or cathedral churches.

Military Advocates, those appointed for the defense of the church, rather by arms and authority than by pleading and eloquence. They were introduced in the times of confusion, when every person was obliged to maintain their own property by force; bishops and abbots not being permitted to bear arms, and the scholastic or gowned advocates being equally unacquainted with them, recourse was had to knights, noblemen, holders, or even to princes.

Nominate Advocates, those appointed by a king or pope. Sometimes the churches petitioned kings, Advocates, &c. to appoint them an advocate; at other times this was done of their own accord. By some regulations, no person was capable of being elected advocate, unless he had an estate in land in the same county.

Regular Advocates, those duly formed and qualified for their profession, by a proper course of study, the requisite oath, subscription, licence, &c.

Subordinate Advocates, those appointed by other superior ones, acting under them, and accountable to them. There were various reasons for the creation of these subordinate advocates; as, the superior quality of the principal advocate, his being detained in war, or being involved in other affairs; but chiefly the too great distance of some of the church-lands, and their lying in the dominions of foreign princes.

Supreme or Sovereign Advocates, were those who had the authority in chief; but acted by deputies or subordinates. These were called also principali, greater, and sometimes general advocates. Such in many cases were kings, &c. when either they had been chosen advocates, or became such by being founders or endowers of churches. Princes had also another title to advocatehip; some of them pretending to be advocati nati of the churches within their dominions.

Advocates, in the English courts, are more generally called counsel. See Counsel.

Faculty of Advocates, in Scotland, a respectable body of lawyers, who plead in all causes before the Court of Session, Judiciary, and Exchequer. They are also entitled to plead in the house of peers, and other supreme courts in England.

In the year 1660, the faculty founded a library upon a very extensive plan, suggested by that learned and eminent lawyer Sir George M'Kenzie of Rofhaugh, advocate to king Charles II. and king James VII. who enriched it with many valuable books. It has been daily increasing since that time, and now contains not only the best collection of law-books in Europe, but a very large and select collection of books on all subjects. Besides, this library contains a great number of original manuscripts, and a vast variety of Jewish, Grecian, Roman, Scots, and English coins and medals.

A candidate for the office of an advocate undergoes three several trials: The first is in Latin, upon the civil law and Greek and Roman antiquities; the second, in English, upon the municipal law of Scotland; and, in the third, he is obliged to defend a Latin thesis, which is impugned by three members of the faculty. Immediately before putting on the gown, the candidate makes a short Latin speech to the lords, and then takes the oaths to the government and de jure.

The faculty at present consists of above 200 members. As an advocate or lawyer is esteemed the gentlest profession in Scotland, many gentlemen of fortune take the degree of advocate, without having any intention of practicing at the bar. The circumstance greatly increases their number, gives dignity to the profession, and enriches their library and public fund. It is from this respectable body that all vacancies on the bench are generally supplied.

Lord Advocate, or King's Advocate, one of the eight great officers of state in Scotland, who as such...
Advowee, in ancient customs and law books, denotes the advocate of a church, religious house, or the like. There were advowees of cathedrals, abbeys, monasteries, &c. Thus, Charlemagne had the title of advowee of St Peter's; King Hugh, of St Riquier; and Bolandus mentions some letters of pope Nicholas, by which he constituted Edward the Confessor, and his successors, advowees of the monastery at Westminster, and of all the churches in England. These advowees were the guardians, protectors, and administrators of the temporal concerns of the churches, &c. and under their authority were passed all contracts which related to them. It appears also, from the most ancient charters, that the donations made to churches were confirmed on the persons of the advowes. They always pleaded the causes of the churches in court, and distributed justice for them, in the places under their jurisdiction. They also commanded the forces furnished by their monasteries, &c. for the war; and even were their champions, and sometimes maintained duels for them.

This office is said to have been first introduced in the fourth century, in the time of Stillicco; though the Benedictines do not fix its origin before the eighth century. By degrees, men of the first rank were brought into it, as it was found necessary either to defend with arms or to protect with power and authority. In some monasteries they were only called confessors; but these, without the name, had all the functions of advowees. There were also sometimes several sub-advowees, or sub-advocates, in each monastery, who officiated instead of the advowees themselves; which, however, proved the ruin of monasteries; those inferior officers running into great abuses.

Hence also, husbands, tutors, and every person in general, who took upon him the defence of another, were denominated advowes, or advocates. Hence several cities had their advowees; which were established long after the ecclesiastical ones, and dwindled from their example. Thus we read in history of the advowees of Augsburg, of Arras, &c.

The vidamis assumed the quality of advowees; and hence it is, that several historians of the eighth century confound the two functions together. Hence also, that several secular lords in Germany bear mitres for their crests, as having anciently been advowees of the great churches.

Spcman distinguishes two kinds of ecclesiastical advowees.—The one, of causes or processins advocati consistorii; the other, of territory or lands, advocati positae. The former were nominated by the king, and were usually lawyers, who undertook to plead the causes of the monasteries. The other, which still subsist, and are sometimes called by their primitive name, advowes, though more usually patrons, were hereditary; as being the founders and endowers of churches, &c. or their heirs.

Women were sometimes advowees, advocatrices. And, in effect, the canon law mentions some who had this title, and who had the same right of presentation, &c. in their churches which the advowees themselves had. In a flat 25 Edw. III. we meet with advowes paramount for the highest patron; that is, the king.

Advowsen, or advowzen, in common law, signifies a right to present to a vacant benefice. Advowson is so called, because the right of presenting to the church was first gained by such as were founders, benefactors, or maintainers of the church. Though the nomination of fit persons to officiate in every diocese was originally in the bishop, yet they were content to let the founders of churches have the nomination of the persons to the churches so founded, referring to themselves a right to judge of the fitness of the persons so nominated.

Advowsons formerly were most of them appendant to manors, and the patrons were parochial barons: the lordship of the manor and patronage of the church were seldom in different hands, until advowsons were given to religious houses. But of late times the lordship of the manor and advowson of the church have been divided.

Advowsons are presentative, collative, or donative: presentative, where the patron presents or offers his clerk to the bishop of the diocese, to be instituted in his church; collative, where the benefice is given by the bishop, as original patron thereof, or by means of a right he has acquired by lapse; donative, as where the king or other patron does, by a single donation in writing, put the clerk into possession, without presentation, institution, or induction.

Sometimes, anciently, the patron had the sole nomination of the prelate, abbots, or prior: either by in-velliture (i.e. delivery of a pastoral staff), or by direct presentation to the diocesan; and if a free election was left to the religious, yet a voce d'alter, or licence of election, was first to be obtained of the patron, and the person elected was confirmed by him. If the founder's family became extinct, the patronage of the convent went to the lord of the manor. Unless the several colleges in the universities be restrained in the number of advowsons they may receive, it is argued, they will in time acquire such a flock as to frustrate the designs of their foundation (which is the education of youth, by creating too quick a succession of fellows);
Adz. and Adze, or Adibre, a cutting-tool of the ax kind; having its blade made thin and arching, and its edge at right angles to the handle; chiefly used for taking off thin chips of timber or boards, and for paring away certain irregularities which the ax cannot come at. The adze is used by carpenters, but more by coopers, as being convenient for cutting the hollow sides of boards, &c. It is ground from a base on its inside to its outer edge; so that, when it is blunt, they cannot conveniently grind it without taking its helve out of the eye.

Æ, or Æ, a diphthong compounded of A and E. Authors are by no means agreed as to the use of the æ in English words. Some, out of regard to etymology, insist on its being retained in all words, particularly technical ones, borrowed from the Greek and Latin; while others, from a consideration that it is no proper diphthong in our language, its sound being no other than that of the simple e, contend that it ought to be entirely diñed; and, in fact, the simple e has of late been adopted instead of the Roman æ, as in the word equator, &c.

ÆC, in Grecian antiquity, solemn festivals and games celebrated at Ægina, in honour of Æacus. Æacus, the son of Jupiter by Ægina. When the Ægean was depopulated by a plague, his father, in compassion to his grief, changed all the ants upon it into men and women, who were called Myrmidons, from μυρμύδων, an ant. The foundation of the fable is said to be, that when the country had been depopulated by pirates, who forced the few that remained to take shelter in caves, Æacus encouraged them to come out, and by commerce and industry recover what they had lost. His character for justice was such, that, in a time of universal drought, he was nominated by the Delphic oracle to intercede for Greece, and his prayer was answered. See the article ÆGINA. The Pagans also imagined that Æacus, on account of his impartial justice, was chosen by Pluto one of the three judges of the dead; and that it was his province to judge the Europeans.

ÆBURA, an ancient town of Spain, in Estremadura, on the river Guadiana, to the west of Merida, now called Talavera. W. Long. 7. 15. Lat. 38. 40.

ÆCHMALOTARCHA, in Jewish antiquity, a title given to the principal leader or governor of the Hebrew captives residing in Chaldea, Assyria, and the neighbouring countries. This magistrate was called by the Jews rosh-galah, i. e. the chief of the captives; but the above term, of like import in the Greek, is that used by Origen and others who wrote in the Greek tongue. The Jewish writers assure us, that the echebalotarche were only to be chosen out of the tribe of Judah. The eastern Jews had their princes of the captivity, as the western Jews their patriarchs. The Jews are still said to have an echebalotarcha at Babylon, but without the authority of the ancient ones. Bainage Hist. Jews, and Prideaux's ConneCtion.

ÆCULANUM (anc. geog.), a town of the Hirpini in Italy, at the foot of the Appenine, to the east of Abellium, contracted Eclanum, situate between Beneventum and Tarentum. The inhabitants are called Eclanum, Pliny; and Ecilenes, in an ancient inscription (Gruter). The town is now called Fricon by the people of Naples. E. Long. 15. 36. Lat. 41. 15.

ÆDES, in Roman antiquity, besides its more ordinary signification of a houle, likewise signifies an inferior kind of temple, consecrated to some deity.

ÆDICULA, a term used to denote the inner part of
of the temple, where the altar and statue of the deity stood.

ÆDILE, the office of ædile, sometimes called ædilitus. See the next article.

ÆDILE (ædītus), in Roman antiquity, a magistrate whose chief business was to superintend buildings of all kinds, but more especially public ones, as temples, aqueducts, bridges, &c. To the ædiles like wife belonged the care of the highways, public places, weights and measures, &c. They also fixed the prices of provisions, took cognizance of delinquent, punished law-breakers, and enforced the observance of the laws. The ædiles of the plebeians, on matters of business, for the tribunes, finding themselves oppressed by the actions of the patricians, in the first instance, was called ædiles curule, and were elected every year at Rome. This office required numbers by its expensiveness; so that, in Augustus's time, even many senators declined it on that account.

All these functions which rendered the ædiles so considerable belonged at first to the ædiles of the people, ædiles plebei, or minoræ: these were only two in number, and were first created in the same year as the tribunes: for the tribunes, finding themselves oppressed with the multiplicity of affairs, demanded of the senate to have officers, with whom they might intrust matters of less importance; and accordingly two ædiles were created, and hence it was that the ædiles were elected every year at the same assembly as the tribunes. But these plebeian ædiles having refused, on a signal occasion, to treat the people with shows, as pleading themselves unable to support the expense thereof, the patricians made an offer to do it, provided they would admit them to the honours of the ædiles. On this occasion there were two ædiles created, of the number of the patricians, in the year of Rome 388: they were called ædiles curule, or minoræ; as having a right to sit on a curule chair, enriched with ivory, when they gave audience; whereas the plebeian ædiles only sat on benches. Besides that the curule ædiles shared all the ordinary functions with the plebeian, their chief employ was to procure the celebration of the great Roman games, and to exhibit comedies, shows of gladiators, &c. to the people; and they were also appointed judges in all cases relating to the selling or exchanging of slaves.

To cense these four first ædiles, Caesar created a new kind, called ædiles cereales, as being deputed chiefly to take care of the corn, which was called dominæ cerealis; for the Hestians honoured Ceres as the goddess who presided over corn, and attributed to her the invention of agriculture. These ædiles cereales were also taken out of the order of patricians. In the municipal cities there were ædiles, and with the same authority as at Rome.

We also read of an ædiles alimentariæ, expressed in abbreviation by ædil. alim. whose business seems to have been to provide diet for those who were maintained at the public charge, though others assign him a different office. In an ancient inscription we also meet with ædile of the camp, ædilis exercitus.ÆDILITUM ædicum, among the Romans, was that whereby a remedy was given a buyer, in case a vicious or unlawful feast, or slave, was sold him. It was called ædilicum, because the prevention of frauds in sales and contracts belonged especially to the curule ædiles.

ÆDITUS, in Roman antiquity, an officer belonging to the temple, who had the charge of the offerings, treasure, and sacred utensils. The female deities had a woman officer of this kind called ædita.

ÆGAGROPLA, a ball composed of a substance resembling hair, generated in the stomach, of the chamois-goat. This ball is of the same nature with those found in cows, hogs, &c.

ÆGE, or ÆGIA (anc. geog.), the name of Ægina, so called from the following adventure: Caranus, the first king of Macedonia, being ordered by the oracle to seek a settlement in Macedonia, under the conduct of a flock of goats, surpried the town of Ægina, and sacked it. Hence probably, in the prophet Daniel, the he-goat is the symbol of the king of Macedon.

ÆGEAN SEA (anc. geog.), a part of the Mediterranean, separating Europe from Asia and Africa: washing, on the one hand, Greece and Macedonia; on the other, Caria and Ionia. The origin of the name is greatly disputed. Festus advances three opinions: one, that it is so called from the many islands therein, at a distance appearing like so many goats; another, because Ægina queen of the Amazons perished in it: a third opinion is, because Ægeus, the father of Theseus, threw himself headlong into it.

ÆGEUS, in fabulous history, was king of Athens, and the father of Theseus. The Athenians having财力 killed the son of Minos king of Crete, for carrying away the prize from them, Minos made war upon the Athenians; and being victorious, imposed this severe condition on Ægeus, that he should annually send into Crete a he-goat to be devoured by the Minotaur. On the fourth year of this tribute, the choice fell on Theseus; or, as others say, he himself interceded to be sent. The king, at his son's departure, gave orders, that as the ship failed with black sails, it should return with the same in case it perished; but, if he became victorious, he should change them into white. When Theseus returned to Crete, after killing the Minotaur, and for forgot to change the sails in token of his victory, according to the agreement with his father; the latter, who watched the return of the vessel, supposing by the black sails that his son was dead, called himself headlong into the sea, which afterwards obtained the name of the Ægean Sea. The Athenians decreed Ægeus divine honours; and sacrificed to him as a marine deity, the adopted son of Neptune.

ÆGIAS, among physicians, a white speck on the pupil of the eye, which occasions a dimness of sight.

ÆGIDA (Pihus); now Cape d’Ifiria, the principal
AEGI [ 136 ] AEGI

AEGILops

AEginetan

town on the north of the territory of Istria, situated in a little island, joined to the land by a bridge. In an inscription, (Gruter), it is called *Aegi-lops* Inferna. E. Long. 14. 20. Lat. 43. 50. It was afterwards called *Talos*, after the emperor Julianus. 

**AEGILOPS**, the name of a tumor in the great angle of the eye; either with, or without, an inflammation. The word is compounded of *aε*, goat, and *αωε*, eye; as goats are suppos'd extremely liable to this distemper.

Authors frequently use the words *aegilops*, *anchilops*, and *flfula lacrymalitis*, promiscuously; but the more accurate, after *Aeginetan*, make a difference. —The tumor, before it becomes ulcerous, is properly called *anchilops*; and after it is got into the lacrymal pafages, and has rendered the os lacrymalis carinate, *flsula lacrymalitis*.

If the *aegilops* be accompanied with an inflammation, it is suppos'd to take its rise from the abundance of blood which a plethoric habit discharges on the corner of the eye. If it be without an inflammation, it is suppos'd to proceed from a viscous pustulous humour, thrown upon this part.

The method of cure is the same as that of the ophthalmia. But before it has reached the lacrymal pafages, it is managed like other ulcers. If the *aegilops* be neglected, it bruizes, and degenerates into a *flsula*, which eats into the bone.

**AEGILOPS, *Wild Ficus***, a genus of the monoecea order, belonging to the polygama class of plants, and ranking under the 4th natural order, *Cramina*. —The characters are: The *hermaproditic calyx* is a two-valved glume, triflorous; the corolla a two-valved glume, the exterior valvata terminated by three arilites or awns, the interior anwklefs: *Stamina*, three capillary filamenta; style, two: *Seed*, one, oblong. *Male calyx* and *corolla*, each a glume as in the former; *flsula*, the same number. —There are seven species, natives of Italy and some other parts of Europe; one of them, the incurvata, a native of Britain, grows by the sea-shore, and is vulgarly called *sea-bard grapes*.

**AEGILOPS** is also the trivial name of a species of *Quercus*.

**ÆGINUMUS** (anc. geog.), an island on the bay of Carthage, about 30 miles distant from that city, (Livy); now the *Galeta*: This island being afterwards sunk in the sea, two of its rocks remained above water, which were called *Arce*, and mentioned by Virgil, because the Romans and Carthaginians entered into an agreement or league to settle their mutual boundries at these rocks.

**ÆGINA**, in fabulous history, the daughter of *Æacus*, king of *Bœotia*, was beloved by Jupiter, who debauched her in the similitude of a lambent flame, and then carried her from Epidaurus to a desert island called *Oenope*, which afterwards obtained her own name.

**ÆGINA** (anc. geog.), an island on the Saronic Bay, or bay of Engia, 20 miles distant from the Piraeus, formerly vying with Athens for naval power, and at the sea-fight of Salamin disputing the palm of victory with the Athenians. It was the country and kingdom of *Æacus*, who called it *Ægina* from his mother's name, it being before called *Oenopia*, (Ovid). The inhabitants were called *Æginetan*, and *Æginensis*. The Greeks had a common temple dedicated to Jupiter in *Ægina*. The *Æginetan* applied to commerce: and were the first who coined money, called *numerus* *Æginum*: hence *Ægineum at*, formerly in great repute. The inhabitants were called *Brynydones*, or a nation of ants, from their great application to agriculture. (See *Æacus*.)

This island was surrounded by Attica, the territory of Megara, and the Peloponnesus, each distant about 100 stadia, or 12 miles and a half. In circumference it was reckoned 180 stadia, or 22 miles and a half. It was washed on the east andsouth by the Myrtoan and Cretan seas.

It is now called *Ejina*, or *Ægina*, the g-foth and the i short. The temple abovementioned is situated upon the summit of a mountain called *Panbellenus*, about an hour distant from the shore. The *Æginetans* affirmed it was erected by *Æacus*; in whole time Hellas being terrified by drought, the Delphic oracle was consulted; and the response was, That Jupiter must be rendered propitious by *Æacu*s. The cities interceded to be their mediator: He sacrificed and prayed to Jupiter Panbellenus, and procured rain.

The temple was of the Doric order, and had six columns in front. Twenty-one of the exterior columns are yet standing, with two in the front of the pronaoos and of the polisca, and five of the number which formed the range of the cell. The entablature, except the architrave, is fallen. The fome is of a light brown colour, much eaten in many places, and indicating a very great age. Some of the columns have been injured by boring to their centres for the metal. In several, the juncture of the parts is so exact, that each seems to confist of one piece. This ruin Mr. Chandler considers as scarcely to be paralleled in its claim to a remote antiquity. The situation on a lonely mountain, at a distance from the sea, has preserved it from total demolition, amid all the changes and accidents of numerous centuries.

Near the shore is a barrow, raised, it is related, for Phocis, upon the following occasion. Telamon and Pelcus, sons of *Æacus*, challenged their half-brother Phocus to contend in the Pentathlum. In throwing the stone, which served as a quoit, Pelcus hit Phocus, who was killed; when both of them fled. Afterwards, Telamon sent a herald to affer his innocence. *Æacus* would not suffer him to land, or to apologize, except from the vessel; or, if he chose rather, from a heap cast up in the water. Telamon, entering the private port by night, raised a barrow, as a token, it is likely, of a pious regard for the deceased. He was afterwards condemned, as not free from guilt; and failed away again to Salamis. The barrow in the second century, when seen by Pausanias, was surrounded with a fence, and had on it a rough stone. The terror of some dreadful judgment to be inflicted from heaven had preserv'd it entire and unaltered to his time; and in a country depopulated and neglected, it may still endure for many ages.

The foid of this island is, as described by Strabo, very floy, especially the bittoms, but in some places not unfertile in grain. Besides corn, it produces olives, grapes, and almonds; and abound in pigeons and partridges. It has been related, that the *Æginetans* annually wage war with the feathered race, carefully
ÆGIS, after the loss of his lamented wife, is supposed to have passed the remainder of his days in religious retirement, and to have died soon after the year 840. His life of Charlemagne, his annals from 741 to 829, and his letters, are all included in the 2d volume of Duchefne's Scriptures Francorum. But there is an improved edition of this valuable historian, with the annotations of Hermann Schmincke, in 440, 1744.

ÆGIS, in heathen mythology, a denomination given to the god Pan, because he was represented with the horns, legs, feet, &c. of a goat.

ÆGIS, the ancient mythology, a name given to the shield or buckler of Jupiter and Pallas.

The goat Amalthea, which suckled Jove, being dead, that god is said to have covered his buckler with the skin thereof; whence the appellation ægis, from ophis, a serpentine,掀起物. Jupiter, afterwards resting the beetle to life again, covered it with a new skin, and placed it among the stars. As to his buckler, he made a present of it to Minerva; whence that goddeß's buckler is also called ægis.

Minerva, having killed the Gorgon Medusa, nailed her head in the middle of the ægis, which henceforth had the faculty of converting into stone all those who looked thereon; as Medusa herself had done during her life.

Others take the ægis not to have been a buckler, but a cuirass, or breast-plate, and it is certain the ægis of Pallas, described by Virgil, Æn. lib. viii. ver. 435, must have been a cuirass; since that poet says expressly, that Medusa's head was on the breast of the goddeß. But the ægis of Jupiter, mentioned a little higher, ver. 354, seems to have been a buckler: the words Cum sage migratæ ægidæ concubint ægis concurrent

Ægis concurrent dextræ,
agreeing very well to a buckler; but not at all to a cuirass or breast-plate.

Servius makes the same distinction on the two passages of Virgil: for on ver. 354, he takes the ægis for the buckler of Jupiter, made, as above mentioned, of the skin of the goat Amalthea; and on ver. 455 he describes the ægis as the armour which covers the breast, which in speaking of men is called cuirass, and ægis in speaking of the gods. Many authors have overlooked these distinctions for want of going to the sources.

ÆGIS, in ancient history, was the son of Tyndale by his own daughter Pilopela, who, to conceal her shame, exposed him in the woods: some say he was taken up by a shepherd, and suckled by a goat, whence he was called Ægillis. He corrupted Cly-
AEGO [138] AEGO

ÆGITHALUS tenuifera the wife of Agamemnon; and with her affiance flew her husband, and reigned seven years in Mycenæ. He was, together with Clytemnestra, slain by Orestes. Pompey used to call Julius Caesar Ægithus, on account of his having corrupted his wife Mutia, whom he afterwards put away, though he had three children by her.

ÆGITHALUS (anc. geog.), a promontory and citadel of Sicily, between Drypanum and the Empori-um Aegismanum, afterwards called Aelius; corruptly written Ægitharfish, in Ptolemy; situated near mount Eryx, and now called Copo di Santo Teodoro.

ÆGIUM, (anc. geog.) a town of Achaea Propria, five miles from the place where Helice flood, and famous for the council of the Acheans, which usually met there on account either of the dignity or commodious situation of the place. It was also famous for the worship of Ægigiane, Conventual Jupiter, and of Panthæan Ceres. The territory of Ægium was watered by two rivers, viz. the Phoenix and Meganitas. The epithet is Ægiumis. There is a coin in the cabinet of the king of Prussia, with the inscription Art, and the figure of a tortoise, which is the symbol of Peloponnesus, and leaves no doubt as to the place where it was struck.

ÆGOBOULUM, in antiquity, the sacrifice of a goat offered to Cybele. The ægobolum was an expiatory sacrifice, which bore a near resemblance to the taurusbolium andcribolium, and seems to have sometimes joined with them.

ÆGOPODIUM, SMALL WILD ANGELICA, GOAT-WORT, GOATSFOOT, HERB GERARD, or ASH WEEDE; a genus of the digynia order, belonging to the pentandria class of plants; the characters of which are: The universal calyx is a manifold convex umbel; the partial one, coniflaral and flat; there is no involucrum; and the proper perianthium is scarcely discernible: The universal corolla is uniform, the florets all fertile; the proper one has five inverte-ovate, concave, equal petals, inflected at the top: The stamina confift of five simple filaments twice the length of the corolla; the antheræ roundish: The pistillum has a germen beneath; two purple erect styli the length of the corollett; the stigmate are headed: No pericarpium: The fruit is ovate, fricated, and bipartite: The seeds are two, ovate, on one side convex and fricated, and flat on the other. There is but one species, a native of Britain and other parts of Europe. It is very common under hedges and about gardens; the leaves resemble those of Angelica, and it carries small white flowers. Its roots run so faft, as to render it a very troublesome weed.

ÆGOPRICORN, a genus of the monoecea order, belonging to the diandria class of plants; the characters of which are: The calyx both of the male and female is tubular perianthium of one leaf divided into three segments: Corolla wanting in both: The stamina consist of a single erect filament longer than the calyx, with an ovate anthera: The pistillum has an ovate germem, three divaricated styli, and simple perifent stigma: The pericarpium is a globular berry, three-grained within, and three-celled: The seeds are solitary, and angular on one side.—There is but one species, a native of Surinam.

ÆGOSPOTAMOS, (anc. geog.), a river in the Thracian Cheroneus, falling with a south-east course into the Hellepont, to the north of Cefнос; also a town, station, or road for ships, at its mouth. Here the Athenians, under Conon, through the fault of his colleague Isocrates, received a signal overthrow from the Lacedemonians under Lyfander, which was followed by the taking of Athens, and put an end to the Peloponnesian war. The Athenian fleet having followed the Lacedemonians, anchored in the road, over against the enemy, who lay before Lampèacus. The Hellepont is not above two thousand paces broad in that place. The two armies facing themselves so near each other, expected only to rest that day, and were in hopes of coming to a battle on the next.

But Lyfander had another design in his view. He commanded the seamen and pilots to go on board their galleys, as if they were in reality to fight the next morning at break of day, to hold themselves in readiness, and to wait his orders with profound silence. He commanded the land-army in like manner to draw up in battle upon the coast, and to wait the day without noise. On the morrow, as soon as the sun was risen, the Athenians began to row towards them with their whole fleet in one line, and to bid them defiance. Lyfander, though his ships were ranged in order of battle, with their heads towards the enemy, lay still without making any movement. In the evening, when the Athenians withdrew, he did not suffer his folders to go ahoare, till two or three galleys, which he had before to observe them, were returned with advice that they had seen the enemy land. The next day paffed in the same manner, as did the third and fourth. Such a conduct, which argued reserve and apprehension, extremely augmented the security and boldness of the Athenians, and inspired them with an extreme contempt for an army, which, fear, in their sense, prevented from showing themselves, and attempting anything.

Whilest this paffed, Alcibiades, who was near the fleet, took horse, and came to the Athenian generals; to whom he represented, that they kept upon a very disadvantageous coast, where there were neither ports nor cities in the neighbourhood; that they were obliged to bring their provisions from Céfнос with great danger and difficulty; and that they were very much in the wrong to suffer the folders and mariners of the fleet, as soon as they were ahoare, to straggle and disperse themselves at their own pleasure, whilst they were faced in view by the enemy's fleet, accustomed to execute the orders of their general with the deadlest obedience, and upon the slightest signal. He offered also to attack the enemy by land with a strong body of Thracian troops, and to force them to a battle. The generals, especially Tydeus and Menander, jealous of their command, did not content themselves with refusing his offers, from the opinion, that if the event proved unfortunate, the whole blame would fall on them, and if favourable, that Alcibiades alone would have the honour of it; but rejected also with insult his wife and sultanary council, as if a man in disgrace lost his sense and abilities with the favour of the commonwealth. Alcibiades withdrew.

The fifth day the Athenians presented themselves again, and offered battle; returning in the evening according to custom with more infulting airs than the days before. Lyfander, as usual, detached some galleys to observe them, with orders to return with the utmost
EGYPTIAN artificers, when they saw the Athenians land;
ed, and to put up a brazen buckler at each ship's head as
soon as they reached the middle of the channel.

Himself in the mean time ran through the whole line in
his galley, exhorting the pilots the feamen and soldiers in readiness to row and fight
on the first signal.

As soon as the bucklers were put up in the ships' heads, and the admiral galley had given the signal by
the sound of trumpet, the whole fleet set forward in
good order. The land-army at the same time made all
possible haste to the top of the promontory to see the
battle. The strait that separates the two continents
poisible as soon as they reached the middle of the
good order.

heads, which was presently
seen, and others he forced to go on board their
they were no sooner come on
embark. In the height of farrow and
trouble, fame he called to by their names, fame he
peeling nefians, falling upon the
their
where he took refuge with Evagoras. The
a great noife of their oars, when Conon, disengaging
the wall or rampart, or, in the
parts of Germany;

AEGYPTIUS, (fab. hist.) was the son of Belens, and
brother of Danans. See BEIDES.

ELINATÆ, in antiquity, a denomination given to
the senators of Milectus, because they held their delibera-
tions on board a ship, and never returned to land,
till matters had been agreed on.

ELIAN (Claudius), born at Prænesta in Italy. He
taught rhetoric at Rome, according to Perizonius,
under the Emperor Alexander Severus. He was famed
for his works on Natural History and Animals. He com-
posed likewise a book on Providence, mentioned by
Pliny, and another on divine Appearances, or The
Histories of Providence. There have been several editions of
his various Histories.

ELIUS PONS (anc. geog.) one of the fortresses near
the wall or rampart, or, in the words of the Notitia,
through the line of the hither wall; built, as is thought,
by Adrian*. Now Portland, (Camden), in North-
umberland, between Newcastle and Morpeth.

ELIUS PONS, now il Ponte S. Angelo, a stone-
bridge at Rome, over the Tiber, which leads to the
Burgo and Vatican from the city, along Adrian's mole,
built by the Emperor Adrian.

ELFRED. See ALFRED.

ELURUS, in Egyptian mythology, the deity or
god of cats: sometimes personified as a cat, and
sometimes like a man with a cat's head. The Egyp-
tians had it superstitious a regard for this animal, that
the killing it, whether by accident or design, was
punished with death: and Didorus relates, that, in the
time of extreme famine, they chose rather to eat one
another than to touch these sacred animals.

AEM, AM, or AME, a liquid measure used in most
parts of Germany; but different in different towns;
the aem commonly contains 20 versili, or 80 ma-
fes; that of Heidelberg is equal to 48 maizes; and that of
Wtmerbergh to 160 maizes. See AM.

EMILUS (Paulus), the son of Lucius Paulus,
who was killed at the battle of Canne, was twice con-
ful. In his first consulship he triumphed over the Lib-
garians; and in the second subdued Perieus king of
Macedonia, and reduced that country to a Roman pro-
vince, on which he obtained the surname of Macedoni-
cus. He returned to Rome loaded with glory, and
triumphed for three days. He died 168 years before
Christ.

EMILUS (Paulus), a celebrated historian, born at
Verona, who obtained such reputation in Italy, that he
was invited into France by the cardinal of Bourbon, in
the
The reign of Lewis XII. in order to write the history of the kings of France in Latin, and was given a cameo in the cathedral of Paris. He was near 30 years in writing that history, which has been greatly admired; and died at Paris on the 5th of May 1529.

MOBOLIUM, in antiquity, the blood of a bull or ram offer'd in the sacrifices, called taurobolia and erichnia; in which sense the word occurs in ancient inscriptions.

ÆNARIA (anc. geog.), an island on the bay of Cumae, or over-against Cumae in Italy, (Pliny.) It is also called Cerinthus, (Virgil;), and now Ischia: scarce three miles distant from the coast, and the promontory Milenuis to the west; 20 miles in compass; called Pitha by the Greeks. It is one of the Oenotrides, and fenced round by very high rocks, so as to be inaccessible but on one side; it was formerly famous for its carthare. See ISCIA.

ÆNEAS (fab. hist.), a famous Trojan prince, the son of Anchises and Venus. At the destruction of Troy, he bore his aged father on his back, and saved him from the Greeks; but being too solicitous about his son and house-gods, lost his wife Creuca in the escape. Landing in Africa, he was kindly received by Queen Dido: but quitting her coast, he arrived in Italy, where he married Livinia the daughter of king Latinus, and defeated Turnus, to whom the name of his prince immortal, by making him the martyr, and defeated Turnus, to whom the name of this prince immortal, by making him the hero of his poem. See ÆNEID.

Æneas Sylvius, (Pope.) See PIUS II.

ÆNEATORES, in antiquity, the musicians in an army, including those who played drums, horns, &c. The word is formed from æneas, on account of the brazen instruments used by them.

ÆNEID, the name of Virgil's celebrated epic poem.

Blair's Latin.

The subject of the Æneid, which is the establishment of Æneas in Italy, is extremely happy. Nothing could be more interesting to the Romans than to look back to their origin from so famous a hero. While the object was splendid itself, the traditionary history of his country opened interesting fields to the poet; and he could glance at all the future great exploits of the Romans, in its ancient and fabulous state.

As to the unity of action, it is perfectly well preserved in the Æneid. The settlement of Æneas, by the order of the gods, is constantly kept in view. The schemes are linked properly with the main subject. The nodus, or intrigue of the poem, is happily managed. The wrath of Juno, who opposes Æneas, gives rise to all his difficulties, and connects the human with the celestial operations throughout the whole poem.

One great imperfection of the Æneid, however, is, that there are almost no marked characters in it. Achaæs, Cloanthes, Gyas, and other Trojan heroes who accompanied Æneas into Italy, are inoffensive figures. Even Æneas himself is without interest. The character of Dido is the best supported in the whole Æneid. The principal excellence of Virgil is tenderness. His song was full of sensibility. He must have felt himself all the affecting circumstances in the scenes he describes; and he knew how to touch the heart by a single stroke. In an epic poem this merit is the next to sublimity. The second book of the Æneid is one of the greatest master pieces that ever was executed. The death of old Priam, and the family-pieces of Æneas, Anchises, and Creuca, are as tender as can be conceived. In the fourth book, the unhappy passion and death of Dido are admirable. The episodes of Pallis and Evander, of Nifus and Euryalus, of Lausus and Mezentius, are all superlatively fine.

In his battles, Virgil is far inferior to Homer. But in the important episode, the descent into hell, he has outdone Homer by many degrees. There is nothing in antiquity to equal the sixth book of the Æneid.

ÆNGINA, one of the islands of the Archipelago. It lies in the bay of Engia, and the town of that name contains about 500 houres and a castle; and near it are the ruins of a magnificent structure, which was probably a temple.

ÆNIGMA, denotes any dark saying, wherein some well-known thing is concealed under obscure language. The word is Greek, Ανιγμα, formed of ανιγμα, obscure insinuate, to hint a thing darkly, and of αιγμα, an obscure speech or discourse. The popular name is riddle; from the Sylisac rædsyn, or the Saxon rædstan, to interpret. Fa. Bouhuris, in the memoirs of Teverus, defines an ænigma, A discourse, or painting, including some hidden meaning, which is proposed to be guessed. Painted ænimas are representations of the works of nature, or art, concealed under human figures, drawn from history, or fable.

A verbal ænimà is a witty, artful, and abstruse description of any thing.—In a general sense, every dark saying, every difficult question, every parable, may pass for an ænigma. Hence obscure laws are called ænimata juris. The alchemists are great dealers in the ænimatic language, their proceeds for the philosophers' stone being generally wrapped up in riddles: c. e. Fac ex mare et fæmina circulum, inæ quadratum, hinc triangulum, fac circulum, et habebis lapidem philosophorum.—F. Menestrier has attempted to reduce the composition and resolution of ænimas to a kind of art, with fixed rules and principles, which he calls the philosophy of ænimatic images.

The Subject of an ænimà, or the thing to be concealed and made a mystery of, he justly observes, ought not to be such in itself; but, on the contrary, common, obvious, and easy to be conceived. It is to be taken, either from nature, as the heavens, or stars; or from art, as painting, the compas, a mirror, or the like.

The Form of ænimas consists in the words, which, whether they be in prose or verse, contain either some description, a question, or a proverbiation. The last kind are the most pleasing, inasmuch as they give life and action to things which otherwise have them not. To make an ænimà, therefore, two things are to be pitched on, which bear some resemblance to each other; as the sun and a monarch; or a ship and a house; and on this resemblance is to be raised a superfature of contrarieties to amuse and perplex. It is easier to find great subjects for ænimas in figures than in words, inasmuch as painting attracts the eyes and excites the attention to discover the sense. The subjects of ænimas in painting, are to be taken either from history or fable: the composition here is a kind of metamorhosis,
Enigmas, in which human figures are changed into trees, and rivers into metals. It is essential to any picture, it may be known to every body; otherwise it will be two enigmas instead of one; the first of the history or fable, the second or fable in which it is to be taken. Another essential rule of the enigma is, that it only admits of one feme. Every enigma which is susceptible of different interpretations, all equally natural is far imperfect. What gives a kind of crucifixion to an enigma, is an invention of figures in situations, gestures, colours, &c. authorized by passages of the poets, the customs of artificers in statues, bas-relievo, inscriptions, and foreign languages.

The explanation of ENIGMAS makes a considerable exercise; and that one of the most difficult and amusing, where wit and penetration have the largest field.

—By explaining an enigma, is meant the finding a motto corresponding to the action and persons represented in a picture, taken either from history or mythology. The great art of this exercise consists in the choice of a motto, which either by itself, or the circumstances of time, place, person who speaks, or those before whom he is speaking, may divert the spectators, and furnish occasion for strokes of wit; all the more to advantage the conformities between the figure and thing figured; giving ingenious turns to the reasons employed to support what is advanced, and in artfully introducing pieces of poetry to illustrate the sujet de and awaken the attention of the audience.

As to the solution of enigmas, it may be observed, that those expressed by figures are more difficult to explain than those consisting of words, by reason images may signify more things than words can; so that to fix them in a particular sense, we must apply every situation, symbol, and without omitting a circumstance. As there are few persons in history, or mythology, but have some particular character of vice or virtue, we are, before all things, to attend to this character, in order to divine what the figure of a person represented in a painting signifies, and to find what agreement this may have with the subject whereof we would explain it. Thus, if Proteus be represented in a figure, it may be taken to denote insensibility, and applied either to a physical or moral subject, whose character is to be changeable; e.g. an almanack, which expresses the weather, the feasons, heat, cold, storms, and the like. The colours of figures may also help to unriddle what they mean: white, for instance, is a mark of innocence, red of modesty, green of hope, black of sorrow, &c. When figures are accompanied with symbols, they are less precarious; these being, as it were, the soul of enigmas, and the key that opens the mystery of them. Of all the kinds of symbols which may be met with in those who have treated professedly on the subject, the only truly enigmatical are those of Pythagoras, which, under dark proverbs, hold forth effons of morality: as when he says, Statere in se tranquillas, to signify, Do no injustice. But it must be added, that we meet with some enigmas in history, complicated to a degree, which much transcends all rules, and has given great perplexity to the interpreters of them. Such is that celebrated ancient one, Enilda Crispis, about which many of the learned have puzzled their heads. There are two exemplars of it: one found 140 years ago, on a marble near Bologna: the other in an ancient MS. written in Gothic letters, at Milan. It is controverted between the two cities, which is to be reputed the more authentic.

The Bononian Enigma.

D. M.

Ælia Lelia Crispis,

Nec vir, nec mulier,

Nec androgyne;

Nec puella, nec juvenis,

Nec anus;

Nec caulis, nec materrix,

Nec indicia;

Sed omnia:

Subhata

Necque fane, necque ferro,

Necque veneno;

Sed omnibus:

Neculo, nec terris,

Nec aquat,

Sed ubiue iacet.

Lucius Agatho Prisnus,

Nec maritus, nec amator,

Nec necessarius;

Necque marcius, necque be advert,

Necque fogs;

Hanc,

Nec molem, nec pyramidem

Nec sepulchrum,

Sed omnia,

Seit et nefcit, eas pofuerit.

That is to say, To the god: Land, Ælia Lelia Crispis, neither man, nor woman, nor hermaphrodite; neither girl, nor young woman, nor old, neither chaste, nor a whore; but all these: killed neither by hunger, nor fleat, nor pain; but by all these: repels neither in heaven, nor on earth nor in the waters; but every where. Lucius Agatho Prisnus, neither her husband, nor lover, nor friend; neither forsworn, nor joyful, nor weeping, certain or uncertain, to whom he rears this monument, neither erects her a temple, nor a pyramid, nor a tomb, but all these. In the MS. at Milan. Instead of D. M. we find A. M. P. P. D. and at the end the following addition:

Hoc eft sepulchrum inus cadaver non baletis,

Hoc eft cadaver sepulchrum extru non baletis,

Sed cadaver idem eft et sepulchrum

We find near 50 several solutions of this enigma, advanced by learned men. Marius Michael Angelus maintains Ælia Lelia Crispis to signify rain-water falling into the sea. R. Vitus first explained it of Niobe turned to a stone, afterwards of the rational soul, and afterwards of the Platonic idea: Jo. Turrisius, of the materia prima: Fr. Schottius, of an encauch; Nic. Bernardis, of the philosophia-terrene, in which he is followed by Boschius; Zach. Pontinus, of three human bodies in the same situation, and buried by three different men at the same time; Nelfiandus, of a law-suit; Jo. Graf. Gerarium, of love; Zu. Boxhornius, of a shadow; P. Terronius, of matter, Fort Libenius, of generation, friendship, and privation: M. Cv. Montalbanus, of hemp; Car. af. Malvafia, of an abortive girl promised in marriage; Pet. Mengius, of the rule of chafity, prescribed by the founder of the military
ÆOL, a military religion of St Mary; M. de Ciconia, of pope Joan; Heumannus, of Lor’s wife; and lastly, J. C. S. an anonymous writer in the Leipic Acts, of the Christian church.

ÆGMATOGRAPHY, or ÆGMATOGRAPHY, the art of resolving or making enigmas.

ÆNONA (anc. geog.), a city of Liburnia, called by Pliny Civitas i s. lajina, the reason of which is unknown; also Ænona, and is now called Nona; on the Adriatic, by which it is for the greater part surrounded; over against the island Gilfa, from which it is distant four miles to the west. E. Long. 160, Lat. 28°.

ÆNUS (anc. geog.), now the Inn, a river of Germany, which, rising in the country of the Grifons, out of the Alps, in the district called Gottes-haus-punt, runs through the Grifons, the country of Tyrol, the duchy of Bavaria, and through Passau into the Danube.

ÆNUS, Ænis, or Ænum (anc. geog.), a town of Thrace, situate on the east-end mouth of the Hebrus, which has two mouths, and said to be built by the Cumeans. It was a free town, in which flood the tomb of Polydorus, (Pliny) Ænis is the epithet. Here the brother of Catu Uticensis died, and was honoured with a monument of marble in the forum of the Ænus, (Plutarch) called Ænetis, (Stephanus) Livy says that the town was otherwise called Æthynus. Now Æna.

ÆNITIOLOGIUS, in poetry, a verse of two dactyls and three trochees; as, Pradlia diva placenta truci juventus.

ÆOLIE INSULÆ, now Isola di Lipari, (anc. geog.) feven islands, situated between Sicily and Italy, so called from Æolus, who reigned there about the time of the Trojan war. The Greeks call them Hephaestias; and the Romans Pyliasia, from their fiery eruptions. They are also called Liparaverum Insulae, from their principal island Lipara. Dionysius Periegetes calls them Æneas because circum navigable.

ÆOLIC, in a general sense, denotes something belonging to Æolus.

ÆOLIC, or Æolian, in grammar, denotes one of the five dialects of the Greek tongue. It was first used in Boeotia; whence it passed into Ἐλλαδα, and was that which Sappho and Alcaeus wrote in. The Æolic dialect generally throws out the aspirate or sharp spirit, and agrees in so many things with the Doric dialect that the two are usually confounded together.

Æolic Onoma, a name given to the letter ο, which the Æolians used to prefix to words beginning with vowels as φοινικα, for φοινικα, also to infer between vowels, as ειρετικ, for ειρετικα.

Æolic Verse, in profody, a verse consisting of an iambus, or spondee; then of two anapaests, separated by a long syllable; and, lastly, of another syllable. Such as, ὁ δεινοστρεμθηδων ορθος. This is otherwise called enotic verse; and, from the chief poets who used it, Archibius and Pindar.

ÆOLIPILE, in hydraulics, is a hollow bowl of metal, generally used in courses of experimental philosophy, in order to demonstrate the possibility of converting water into an elastic steam or vapour by heat. The instrument therefore, consists of a slender neck, or pipe, having a narrow orifice inserted into the ball by means of a hollowed screw. This pipe being taken out, the ball is filled almost full of water, and the pipe being again screwed in, the ball is placed on a pan of kindled charcoal, where it is well heated, and there issues from the orifice a vapour, with prodigious violence and great noise, which continues till all the included water is discharged. The stronger the fire, the more elastic and violent will be the steam; but care must be taken that the small orifice of the pipe be not, by any accident, stopped up; because the instrument would in that case infallibly burst in pieces, with such violence as may greatly endanger the lives of the persons near it. Another way of introducing the water is to heat the ball red-hot when empty, which will drive out almost all the air; and then by suddenly merging it in water, the pressure of the atmosphere will force it in, till it is nearly full. Des Cartes and others have used this instrument to account for the natural cause and generation of the wind; and hence it was called Æolophus q.d. pia Æolis, the ball of Æolus or of the god of the winds.

ÆOLIS, or ÆOLIA (anc. geog.), a country of the Hither Asia, settled by colonies of Æolian Greeks. Taken at large, it comprehends all Troas, and the coast of the Hellepont to the Propontis, because in those parts there were several Æolian colonies: more briefly, it is situated between Troas to the north, and Ionia to the south. The people are called Æolites, or Æolii.

ÆOLIA MARÉ (anc. geog.), a part of the Egean sea, walking Æolus; called also Myfium, from Myfia, now called, Cofo di Smyrna.

ÆOLUS in heathen mythology, the god of the winds, was said to be the son of Jupiter by Acasta, or Sigeia, the daughter of Hippotus; or, according to others the son of Hippotus by Meneclea, daughter of Hyllus king of Lipara. He dwelt in the island Strongyle, now called Stromboli, one of the seven islands called Æolian from their being under the dominion of Æolus. Others say, that his residence was at Regium, in Italy; and others again place him in the island Lipara. He is represented as having authority over the winds, which he held enchaîned in a vast cavern to prevent their continuing the devastations they had been guilty of before they were put under his direction. Mythologists explain the original of these fables, by saying, that he was a wife and good prince; and, being skilled in astronomy, was able, by the flux and reflux of the tides, and the nature of the volcano in the island Strongyle, to foretell storms and tempests.

Æolus, or Æolus, or the Æolian lyre. See Acoustics, no. 10.

ÆON, a Greek word, properly signifying the age or duration of anything.

Æon, among the followers of Plato, was used to signify any virtue, attribute, or perfection; hence they represented the deity as an assemblage of all possible aeons; and called him περεμα, a Greek term signifying πνεύμα. The Valentinians, who, in the first ages of the church, blended the conceits of the Jewish cabalists, the Platonists, and the Chaldean philosophers, with the simplicity of the Christian doctrine, invented a kind of Theogony, or Genealogy of Gods (not unlike that of Hefiod), whom they called by several glorious names, and all by the general appellation of άεόνας; among which they reckoned θανώς, Life; ζωή, Word; θειοπάθεια, Only-begotten; παράσιτος, Fugitive; and many other divine powers and emanations, amounting in
The idea of an era comprehends also a certain succession of years proceeding from a fixed point of time, and the epoch is that point itself. Thus the Christian era began at the epoch of the birth of Jesus Christ. See Chronology, where the different eras, &c. are enumerated and explained.

ÆRARIUM, the treasury or place where the public money was deposited amongst the Romans.

ÆRARIUM Victorum, the place where the money arising from the taxes levied from foreign countries was laid up, so called because it most commonly consisted of a twentieth part of all legacies: this was kept for the extreme necessities of the state.

ÆRARIUM Privatum was the emperor's private purse, or the place where the money arising from his private patrimony was deposited.

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AERIAL, in a general sense, denotes something pertaining to nature of air; thus, aerial substance, aerial particles, &c. - Aerial Perspective: See Perspective and Painting.

AERIANS, in church history, a branch of Arians, who, to the doctrines of that sect, added some peculiar dogmas of their own; as, that there is no difference between bishops and priests; a doctrine maintained by many modern divines, particularly of the presbyterian and reformed churches. The sect received its denomination from Aærius an Armenian priest of the fourth century. He founded his doctrine chiefly upon some passages in St Paul; and, among others, upon that in 1 Tim. iv. 14, where the apostle exhorts him not to neglect the gift he had received by the laying on of the hands of the Presbytery. Here, observes Ac-

AEROROLOGY,

The doctrine or science of air, its nature and different species, with their ingredients, properties, phenomena, and uses.

Air, in a general sense, is that invisible fluid everywhere surrounding the globe; on which depends not only animal but vegetable life; and which, in short, to be one of the great agents employed by nature in carrying on her operations throughout the world.

Though the attention of philosophers has in all ages been engaged in some measure by inquiries concerning the nature of the atmosphere, yet till within these last 30 years, little more than the mere mechanical action of this fluid was discovered, with the existence of some anomalous and permanently elastic vapours, whose properties and relation to the air we breathe are almost entirely unknown. Within the above-mentioned period, however, the discoveries concerning the constituent parts of the atmosphere itself, as well as the nature of the different permanently elastic fluids which go under the general name of air, have been so numerous and rapid, that they have at once raised this subject to the dignity of a Science, and now form a very considerable, as well as important, part of the modern system of natural philosophy.

These discoveries, indeed, have not been more interesting to philosophers, than useful to science and beneficial to society. Many perplexing processes in chemistry have been explained in consequence of them, several have been facilitated, and a number of new and useful ones have been introduced. The phenomena attending metallic calcinations and reductions have been greatly elucidated. The knowledge of the use of the air in respiration; the method of ascertaining its purity and times for that function; the investigation of dephlogisticated air; the method of impregnating water with fixed air; are all calculated to answer purposes of the highest utility. The medicinal properties of fixed air have been in great measure ascertained, and its antiplectic qualities in certain respects promise to be of considerable advantage. The method of ascertaining the purity of the air of a place, and the manner of ventilating an apartment, are of great use for those concerned in public buildings. In short, there is perhaps no station in life where some knowledge of this subject may not be of use.

Sect. I. Of the general Constitution, Mechanical Properties, and Operations of the Air.

§ 1. The general Constitution of the Air we breathe.

For many ages this fluid was supposed to be simple, and homogeneous; its common operations to depend on its heat, cold, moisture, or dryness; and any effects concerning which could not be explained by these (such as the appearance of pestilential diseases), were reckoned to be entirely supernatual, and the immediate effects of Divine power. But, however simple and homogeneous this fluid may have been thought in former times, it is far from posseing the simplicity of an element, that it is the receptacle of all kinds of effluvia produced from terrestrial substances, both naturally or artificially. Hence whatever maybe the nature of the aerial fluid when absolutely pure, that which we breathe, and commonly goes under the name of air, must be considered as an exceedingly heterogeneous mixture, various at various times, and which it is by no means possible to analyse with accuracy.

Though, in this view, air seems to be a kind of sink in what or common sewer, where all the poisonous effluvia arising from putrid and corrupted matters are deposited; yet it has a wonderful facility of purifying itself, and one way or other of deposing those vapours contained in it; so that it never becomes noxious except in particular places, and for a short time; the general mass remaining upon all occasions pretty much the same. The way in which this purification is effected is different, according to the nature of the vapour with which the air is loaded. That which most universally prevails is water; and from experiments it appears, that the quantity of aqueous vapour contained in the atmosphere is immense. Dr Halley, from an experiment on the evaporation from a fluid surface heated to the same degree with that given by our meridian sun, has calculated, that the evaporation from the Mediterranean sea is alone sufficient to yield all the water of the
Section I. AEROLOGY.

Of Air in general.

The rivers which run into it. Dr. Watson, in his Chemical Experiments, has given an account of some experiments made with a view to determine the quantity of the water raised from the earth itself in time of drought. He informs us, that when there had been no rain for above a month, and the grass was become quite brown and parched, the evaporation from an acre was not less than 1600 gallons in 24 hours. Making afterwards two experiments, when the ground had been wetted by a thunder-shower the day before, the one gave 1795, the other 1905, gallons in 24 hours. From this the air is every moment purified by the ascent of the vapour, which flying off into the clouds, thus leaves room for the exhalation of fresh quantities; so that as the vapour is considerably lighter than the common atmosphere, and of consequence ascends with greater velocity, the air during all this time is said to be dry, notwithstanding the vast quantity of aqueous fluid that passes through it.

Nor is it only from the aqueous vapour that the air is purified at this time. Much of that vapour arising from decayed and putrid animal and vegetable substances, and which by some modern philosophers is called phlogiston, attaches itself to the aqueous vapour, and ascends along with it. Another part is absorbed by vegetables; for the phlogistic vapour, as is shewn under Agriculture, no. 5, is probably the food of plants. The phlogistic vapours which ascend along with the water, probably continue there and descend along with the rain; whence the fertilizing qualities of rain-water above those of any other. Thus we may see why a dry air, whether cold or hot, must always be wholesome; but as the atmosphere cannot always receive vapours, it is obvious, that when great rains come on, especially if attended with heat, the lower regions of the air must be overloaded with vapours both of the aqueous and phlogistic kind, and of consequence be very unwholesome.

But besides the aqueous and phlogistic vapours, both of which are specifically lighter than common air, there are others, which, being specifically heavier, cannot be carried off in this manner. Hence these gross vapours contaminate certain places of the atmosphere, rendering them not only unhealthy, but absolutely poisonous. Of these are, 1. Sulphureous, acid, and metallic exhalations. These are produced principally by volcanoes; and as they descend, in consequence of their specific gravity, they suffocate and spread destruction all around them, poisoning not only animals, but vegetables also. 2. The vapours arising from hooves where lead and other metals are melted, have the same pernicious qualities; insomuch that the men who breathe them, the cattle who eat the graps, and the fitches who inhabit the waters on which they fall, are poisoned by them if taken into the body in a certain proportion. 3. Of the same kind are the nocent, or emanations of fixed air, which sometimes proceed from old lavas, or perhaps from some other places even of the surface. From all these the air seems not capable of purifying itself, otherwise than by either dispersing them by winds, or by letting them subside by their superior gravity, till they are absorbed either by the earth or water, according as it is their nature to unite with one or other of these elements. 4. Of this kind also seem to be the vapours which are called properly specific. The contagion of the plague itself seems to be of an heavy digested nature, incapable in general of arising in the air, but attaching itself to the sides of houses, bed-cloths, and wearing apparel. Hence scarce any confutation of the atmosphere can dispel these noxious effluvia; nor does it seem probable that pestilential distempers ever cease until the contagion has operated so long, and been so frequently communicated from one to another, that, like a ferment much exposed to the atmosphere, it becomes rapid, communicates a milder infection, and at last loses its strength altogether.

§ 2. Mechanical Properties of the Air.—In common with water, the air we breathe possesses gravity, and specific conseqentiy will perform everything in that way which water can do, making allowance for the great difference between the specific gravity of water and of air. This difference indeed is exceedingly great, and has been variously calculated. Ricciolus estimates the gravity of air to be to that of water as 1 to 1000; Mercurius, as 1 to 1300, or 1 to 1356; Lana, as 1 to 649; and Galileo, only as 1 to 400. Mr. Boyle, by more accurate experiments makes the air at London to be 1 to 983; and thinks, that, all things considered, the proportion of 1 to 1000 may be taken as a medium. But by three experiments made since that time before the Royal Society, the specific gravity of the air was determined to be to that of water as 1 to 840, 872, and 860. By a very accurate experiment, Mr. Hauksbee fixed the proportion as 1 to 885. But as all these experiments were made when the barometer was at 293 inches, Dr. Jurin supposes, that, at a medium between heat and cold, when the barometer is 30 inches high, the proportion between the two fluids may be taken as one to 800; and this agrees with the observations of the Hon. Mr. Cavendish, made when the barometer was 291 inches, and the thermometer at 50.

By means of its gravity, the air presses with great effects of force upon all bodies, according to the extent of their gravity. M. Pascal has computed the quantity of this preasure to be no less than 2232 pounds upon every square foot of surface, or upwards of 15 pounds on every square inch. According to some experiments made by M. Amontons and de la Hire, a column of air on the surface of the earth, and 36 fathoms high, is equal in weight to three lines depth of mercury. From the barometer, however we know that the whole preasure of the atmosphere is very different; sometimes being equal only to a column of 28 inches, and varying from thence to 31 inches. The whole quantity of preasure must thus be immense, and has been computed equal to a globe of lead 60 miles in diameter.

By means of its gravity, the atmosphere accomplishes many useful purposes in nature. It prevents the aerial vessels of animals and the sap-vessels of plants from being too much diffused by the expansive power (whatever it is), which has a perpetual tendency to swell them out. Thus we see, that, in the operation of cupping, where the preasure of the air is taken off from a particular part, the expansive force instantly acts, and swells out the vessels to a great degree. Hence also, when animals are put into an air-pump, their whole bodies swell.

By
AEROLOGY.

Sect. I.

Of Air in general.

8. Elascity of the air.

By its gravity, the air promotes the union of fluid bodies, which would instantly cease in vacuo. Thus oils and salts, which remain united in air, separate as soon as that fluid is extracted. Hence also, when hot water is put under an exhausted receiver, it boils violently; because the pressure of the air being now taken of, the particles of steam, which existed invisibly among the water, and which the gravity of the atmosphere prevented from flying off so soon, are now hurried up with great velocity, by means of the excessive comparative gravity of the aqueous fluid.

On the gravity of the air depend the ascent of water in pumps, syphons, & c. and likewise all the phenomena of the barometer.

Besides its gravity, which the air has in common with water and other fluids, there is another which it has only in common with steam or vapour. This is called its elasticity; by which, like a spring it allows itself to be compressed into a smaller bulk, and then returns again to its original size upon removing the preasure.

The elasticity of the air was first ascertained by some experiments of lord Bacon, who, upon this principle, constructed the first thermometer, which he called his instrument calculare. Of this power we have numerous proofs. Thus a blown bladder being squeezed in the hand, we find the included air sensibly resist; so that, upon ceasing to compress, the cavities or impressions made in its surface are readily expanded again and filled up.

The structure and office of the Air-Pump depend on this elastic property. Every particle of air always exerts a resist or endeavour to expand, and thus strives against an equal endeavour of the ambient particles; whose resistance happening by any means to be weakened, it immediately diffuses itself into an immense extent. Hence it is that thin glass bubbles, or bladders filled with air, and exactly closed, being included in the exhausted receiver of an air-pump, burst by the force of the air they contain; and a bladder almost quite flaccid, swells in the receiver and appears full. The same effect also takes place, though in a smaller degree, on carrying the flaccid bladder to the top of an high mountain.

It has been questioned among philosophers, whether this elastic power of the air is capable of being destroyed or diminished. Desaguliers found, that air, after having been inclosed for half a year in a wind-gun, had lost none of its elascity; and Roberval, after preserving it in the same manner for 16 years, observed, that its expansive projectile force was the same as if it had been recently condensed. Nevertheless, Mr Haukbee concludes, from a later experiment, that the sprying of the air may be disturbed by a violent preasure, in such a manner as to require some time to return to its natural tone. Dr Hales inferred, from a number of experiments, that the elascity of the air is capable of being impaired and diminished by a variety of causes.

The weight or preasure of the air has no dependence on its elascity; but would be the same whether it had such a property or not. The air, however, being elascic, is necessarily affected by the preasure, which reduces it into such a space, that the elascity, which reacts against the compressing weight, is equal to that weight. In effect, the law of this elascity is, that it increases as the density of the air increases; and the density increases as the force increases by which it is preressed. Now there must necessarily be a balance between the action and re-action: i.e. the gravity of the air which tends to comprcss it, and the elascity by which it endeavour to expand, must be equal. Hence the elascity increasing, or diminishing universally, as the density increaseth or diminishes, it is no matter whether the air be compressed and retained in such a space by the weight of the atmosphere, or by any other means; it must endeavour in either case to expand with the same force. And hence, if air near the earth be pent up in a vessel, and all communication with the external fluid cut off, the preasure of the inclosed air will be equal to the weight of the atmosphere at the time the quantity was confined. Accordingly, we find mercury sustained at the same height, by the elascic force of air inclosed in a glafs vessel, as by the whole atmospheric preasure. On the same principle air may be artificially condensed; and hence the structure of the Air-Gun.

The utmost limits to which air, of the density which it polysifes at the surface of the earth, is capable of being comprressed, have not been ascertained. Mr Boyle conjectured, it was 12 times more dense; Dr Halley says that he has seen it comprressed so as to be 60 times denser than in its natural state, which is farther confirmed by Mr Papin and M. Guygens. Dr Hales, by means of a press, condensed it 38 times; and by forcing water in an iron bell or globe, into 1551 times less space than it naturally occupies. However, Dr Halley has ascertained, in the Philosophical Transactions, Abr. vol. ii. p. 17, that from the experiments made at London, and by the academy del Cimento at Florence, it might be safely concluded, that no force whatever is able to reduce air into 8000 times less space than that which it naturally polysifes on the surface of our earth. In answer to this, M. Amontons, in the Memoirs of the French Academy, maintains, that there is no fixing any bounds to its condensation; that greater and greater weights will still reduce it into less and less compacts; that it is only elascic in virtue of the fire which it contains; and that as it is impossible ever to drive all the fire out of it, it is impossible ever to make the utmost condensation.

The dilatation of the air, by virtue of its elascic force, is found to be very surprizing; and yet Dr Wallis suggests, that we are far from knowing the utmost of which it is capable. Several experiments made by Mr Boyle, it dilated first into nine times its former space; then into 31 times; than into 60; then into 150. Afterwards it was brought to dilate into 8000 times its space, then into 10,000, and even at last into 13,679 times its space, and this altogether by its own expansive force, without the help of fire. On this depend the structure and use of the MANOMETER.

Hence it appears, that the air we breathe near the surface of the earth is comprressed by its own weight into at least the 13,679th part of the space it would polysife in vacuo. But if the same air be condensed by art,
A E R O L O G Y.

§ 3. Effects of the different Ingredients of Air.—

This fluid acts not only by its common properties of gravity and elasticity, but produces numerous other effects arising from the peculiar ingredients of which it consists.

Thus, 1. It not only dissolves and attenuates bodies by its prehension and attrition, but as a chaos containing power of all kinds of menstrua, and consequently possesting power for dissolving all bodies. It is known that iron and copper readily dissolve and become rusty in air, unless well defended with oil. Boerhaave affirms us, that he has seen pillars of iron soon dissolve by air, that they might be crumbled to dust between the fingers; and as for copper, it is converted by the air into a substance much like the verdigris produced by vinegar.

Mr Boyle relates, that in the southern English colonies the great guns rust so fast, that after lying in the air a few years, large cakes of rust or cinders may be separated from them. Acosta adds, that in Peru the air dissolves lead, and consideribly increases its weight. Yet gold is generally esteemed indissoluble by air, being never found to contract rust, though exposed to it ever so long. In the laboratories of chemists, however, where aqua regia is prepared, the air becoming impregnated with a quantity of the vapour of this menstrum, gold contracts a rust like other bodies.

Stones also undergo the changes incident to metals. On bones. Thus Purbeck stone, of which Salisbury cathedral contains, is observed gradually to become softer, and to moulder away in the air; and Mr Boyle gives the same account of Blackington stone. He adds, that air may have a considerable operation on vitriol, even when a strong fire could act no farther upon it. And he has found, that the fumes of a corrosive liquor work more suddenly and manifestly on a certain metal when sustained in the air, than the menstruum itself did, which emitted fumes on those parts of the metal which it covered; referring to the effects of the effluvia of vinegar on copper.

The dissolving power of air is increased by heat, and by other causes. It combines with water; and by access of cold, deposits part of the matter which was kept dissolved in it by a greater degree of heat. Hence the water, by being deposited and condensed upon any cold body, such as glass, &c. in windows, forms fog, and becomes visible.

In the various operations of chemistry, air is a very necessary and important agent; the result of particular chemical processes depending on its presence or absence, on its effects of being open or indlosed. Thus, the parts of animals and vegetables can only be calcined in open air; in close vessels they never become any other than black coals. And these operations are affected by the changes to which the air is liable. Many infusions might be added to this purpose. Let it suffice to observe, that it is very difficult to procure oil of vitriol, per campaurnum, in a clear dry atmosphere; but in a thick moist air it may be obtained with greater ease, and in larger quantities. So, pure well-fermented wine, if it be carried to a place where the air is rendered with

91

147
The changes in the air arise from various causes, and are observable, not only in its mechanical properties, such as gravity, density, &c. But in the ingredients that compose it. Thus, as pitch in Sweden, noted for copper-mines, the mineral exhalations affect the air in such a manner as to discolour the silver coin in purses; and the same effluvia change the colour of brides. In Carniola, Campania, &c., where are mines of sulphur, the air becomes sometimes very unwholesome, which occasions frequent epidemic diseases, &c.

The effluvia of animals also have their effect in varying the air; as is evident in contagious diseases, plagues, murrains, and other mortals, which are spread by an infected air.

For the vivifying principle of air, see the article Blood.

Sect. II. Historical Account of the principal Discoveries concerning the Composition of Atmospheric Air, and other Aerial Fluids.

While the preceding discoveries were making concerning the mechanical and other properties of the air, little notice seems to have been taken of the elementary parts of the air itself, or of the different kinds of fluid which go under that name. It was known, indeed, that air was separable from terrestrial bodies by means of fire, fermentation, &c. But this was commonly reckoned to be the same with what we breathe. Van Helmont, a disciple of Paraeus, was the first who undertook to make inquiries concerning this species of air. He gave it the name of gas fylveyfi, from the Dutch word gheu, significating spirit; and observes, that some bodies resolve themselves almost entirely into it. "Not (says he) that it had been actually contained in that form in bodies from which it was separated; but it was contained under a concrete form, as if fixed, or coagulated." According to this author, the gas sylveyfi is the same with what is separated from all substances by fermentation; from vegetables by the action of fire; from gun-powder when it explodes; and from charcoal when burning. On this occasion he affirms, that 62 pounds of charcoal contain 61 pounds of gas and only one pound of earth. To the effluvium of gas he also attributes the fatal effects of the grotto del Canti in Italy, and the suffocation of workmen in mines. He affirms, that it is to the corruption of the aliment, and the gas discharged from it, that we are to attribute wind, and the discharges of it from the bowels. Upon the same principles he accounts for the swelling of dead bodies which have remained for a time under water, and for the tumours which arise on some parts of the body in certain diseases. He also determines, that this gas is different from the air we breathe; that it has a greater affinity with water; and he imagined it might consist of water reduced to vapours, or a very subtle acid combined with volatile alkali.

My Boyle repeated all Van Helmont's experiments to a more advantage than he himself had performed them, but seems not to have proceeded further in his discoveries than Van Helmont did: only he found some bodies, such as sulphur, amber, camphor, &c., diminish the volume of air in which they burn.

Dr Hales first attempted to determine the quantity of air produced from different bodies; for which purpose he made experiments on almost every known substance in nature, examining them by distillation, fermentation, combustion, combinations, &c. He also first suspected, that the brilliancy and sparkling of the waters called acdious, were owing to the air they contained. But notwithstanding all his discoveries concerning the quantity of elastic fluid obtained from different bodies, he did not imagine there was any essential difference between this fluid and the air we breathe; only that the former was loaded with noxious vapours, foreign to its nature. His suspicion concerning this impregnation was confirmed by M. Venel, professor of confirmed chemistry at Montpelier, in a memoir read before the Royal Academy of sciences in 1750. This gentleman was able to difengage the air from the Seltzer waters, and to measure its quantity; which he constantly found to amount to about one-fifth of its bulk. The water thus deprived of its air became flat, and ceased to sparkle; the only difference then between it and common water was, that the former contained a small quantity of sea-fall. Upon these principles he attempted to recompose Seltzer water, by dissolving in a pint of common water two drachms of soluble alkali, and then adding an equal quantity of marine acid. The quantity of sea-fall produced by the union of these two, he knew would prove equal to that contained in a pint of Seltzer water; and the effervescence produced by the action of the acid and alkali upon each other, he imagined, would produce air sufficient for the impregnation of the water. In this he was not deceived; the water thus produced was not only analogous to Seltzer, but much more strongly impregnated with air.

Dr Black first discovered, that chalk, and the other earths reducible to quicklime by calcination, consist of an alkaline earth, which is soluble in water, but which, when combined with a large quantity of fixed air, becomes insoluble; losing the properties of quicklime, and assuming the natural appearance we observe those earths to have when not reduced into lime. The same thing he discovered in magnesia alba, and in alkalis both fixed and volatile. On the fixed air contained in these bodies, he found not only their property of effervescing with acids to depend, but likewise their mildness; both the alkalis and calcareous earth being highly cautious when deprived of their fixed air. He also found, that this fluid, which he called fixed air, had different degrees of affinity with different substances; that it was stronger with calcareous earth than with fixed alkali; with fixed alkali, than magnesia; and with magnesia, than volatile alkali. He also suspected, that the fixed air of alkaline falls unites itself with the precipitates of metals, when thrown down from acids; and that the increase of weight observable in these precipitates was owing to this cause. But he was of opinion, that the fluid which he called fixed air was very different from the common air we breathe; and therefore adopted the name of air, merely as one already established, whatever impropriety there might be in the term.

It was not long before the discovery of this species of air suggested new theories in physiology and natural philosophy. Mr Haller had inferred, from Dr Hales's experiments,
Of Air in general. Experiments that air is the real cement of bodies; which, fix'd itself in the solids and fluids, unites them to each other, and serves as a bond by which they are kept from dissolution. In 1764, Dr. Macbride of Dublin published a number of experiments in support of this doctrine. From his work it appears, that fixed air is separated, not only from all substances in fermentation, but also from all animal substances as they begin to putrefy; and that this air is capable of uniting itself to all calcareous earths, as well as to all fixed and volatile, and referring to them the property of extinguishing with acids when they have by any means been deprived of it. But though these opinions have since been found erroneous, the conclusions drawn by him from his numerous experiments still hold good, viz. that fixed air is an elastic fluid, very different from the common air we breathe: that it is possessed of a strong antifeptic quality, and may be introduced with safety into the intestinal canal and other parts of the animal economy, where common air would have fatal effects; but is mortal if breathed into the lungs, &c.

In 1766 and 1767, Mr. Cavendish communicated some new experiments to the Royal Society at London, wherein he determines the quantity of air contained in fixed air, when fully saturated with it, to be five-twelfths of its weight, and seven-twelfths in volatile air: that water is capable of absorbing more than its own bulk of this air, that it has then an agreeable, spirituous, and acidulous taste; and that it has the property of dissolving calcareous earths and magnesia, as well as almost all the metals, especially iron and zinc: that the vapour of burning charcoal occasioned a remarkable diminution of common air, at the same time that a considerable quantity of fixed air is produced in the operation. He also found, that solution of copper in spirit of salt, instead of producing inflammable air, like that of iron or zinc, afforded a species of air which lost its effusiveness as soon as it came into contact with water.

The discoveries of Dr Black concerning fixed air had not been long published, when they were violently attacked by some foreign chemists, while his caule was as eagerly espoused by others. The principal opponents were Mr. Meyer apothecary at Ofonbruck, Mr. Crans physician to his Russian Majesty, and Mr. de Smeth at Utrecht. Their arguments, however, were effectually answered at the time by Mr. Jacquin, botanical professor at Vienna; and the numerous discoveries made since that time have given such additional confirmation to his doctrine, that it is now universally adopted by chemists both in Britain and other countries. It was referred, however, for Dr. Priestley to make the great discovery concerning the nature of our atmosphere; and to inform the world, that it is composed of two fluids; the one absolutely noxious, and incapable of supporting animal life for a moment; the other extremely salutary, and capable of preserving animals alive and healthy for a much longer time than the purest air we can meet with. This may be considered as the ultimate period of our history: for since that time the discoveries of philosophers still living, in many different countries, have been so rapid, that it is difficult to obtain the dates of them by any authentic documents; especially as, by reason of such numerous experiments, the same things have not unfrequently been discovered by different persons, known to each Dephlogisticated other. We must therefore proceed to give an account of the different kinds of fixed fluids, beginning with those which are known, or supposed, to constitute a part of our atmosphere.

§ I. Discovery and Methods of procuring this Kind of Air. Dephlogisticated air was first obtained by Dr. Priestley on the 11th of August 1774. The circumstances which led him to the discovery, were his having procured inflammable air from spirit of salt, by adding to it spirit of wine, oil of olives, oil of turpentine, charcoal, phosphorus, bees wax, and even sulphur. Hence he supposed, that the common air we breathe might be composed of some kind of acid united with phlogiston. On this supposition he extracted air from whence mercurycalculates per se, by exposing it to the focus of extractions of a burning-glass 12 inches in diameter; and, having repeated the experiment with red precipitate and muriate, he found, that though a quantity of fixed air was always produced, yet after that was separated, the remainder supported flame much more vigorously than common air; for a candle burned in it with a flame very much enlarged, and with a crackling noise, at the same time that it appeared fully as much diminished by the tepid of nitrous air. Whence he concluded, that it was respirable; and, on making the experiment, found that it actually was so, for a mouse lived a half hour in a quantity of this fluid; which, had it been common air, would only have kept it alive half that time. Nor did the animal seem to be otherwise injured than by the cold; as it presently revived on bringing it near the fire, and the remainder of the air still appeared better than that of the atmosphere, when the tepid of nitrous air was applied to it.

This pure kind of air being discovered, the Doctor why not next proceeded to name it dephlogisticated, from his most deplorable opinion that common air, in the act of burning, absorbed phlogiston; of consequence, he deduced, which absorbed the most, or which most vigorously and for the greatest length of time supported flame, was supposed to contain the smallest quantity of this phlogiston. In the course of his inquiries why this kind of air comes to be so much dephlogisticated, he fell upon a method of extracting it from a great variety of substances, viz. by moistening them with spirit of niter, and then distilling them with a strong heat. Thus he obtained it from flowers of zinc, chalk, quicklime, slaked from a lime, tobacco-pipe clay, flint, Mufcovy tallow, and even great varieties. He then found, that by simply dissolving any piece of sulphur in the nitrous acid, and then distilling the solution, he could obtain very pure air; and Mr. Withraille found even the trouble of distillation unnecessary; nothing more being requisite than to moisten red lead with the spirit of niter, and then pour upon it the oil of vitriol, which instantly dengaged the dephlogisticsed air without applying any more heat than was generated by the mixture.

While discoveries of this kind engaged Dr. Priestley in England, Mr. Scheele was employed in a similar manner in Sweden; and had actually obtained the same kind of air, without knowing anything of what Dr. Priestley had done. The latter had the merit of the prior
AEROLOGY

Dephlogisticated Air

Prior discovery: but Mr. Scheele's method was more simple, consisting only in the distillation of nitre with a strong heat; by which means it is now found that dephlogisticated air may be obtained in very considerable quantity, and in as great purity, as by the more expensive processes. The pure air from nitre had indeed partly been obtained by Dr. Hales long before this time; since he informs us, that half a cubic inch of nitre yielded 90 cubic inches of air, which was undoubtedly the fluid we speak of; but as he neglected to practice this discovery, nothing farther was known at that time.

As the nitrous acid was universally concerned in the first processes for obtaining this kind of air, it was for some time generally believed to be a peculiar property of that acid alone to produce it; but the indefatigable genius of Dr. Priestley soon found, that it might not only be procured where no nitrous acid was employed, but where the substances were treated with vitriolic acid. It was indeed evident, from the very first experiment, that nitrous acid was not essentially necessary; since pure air was procured from precipitate per fe, in the preparation of which no nitrous acid is employed. The Abbé Fontana found, that 192 grains of this substance yielded 65½ cubic inches of dephlogisticated air, at the same time that the weight of it was reduced to 788 grains, which is nearly the weight of that quantity of air. It had formerly been observed, that the weight of mercury is augmented during its conversion into precipitate per fe, as that of lead is by its conversion into minium. The experiments just now mentioned, therefore, show, that during this process the air is decomposed; the pure dephlogisticated part of it being absorbed by the metal, and appearing again on the application of heat; and the same appears to be the case with red lead, from the experiment of Mr. Warthire already mentioned. With regard to this last substance, however, a very great irregularity is observed; viz. that when newly prepared it yields none at all, and even for some time after the produce is much smaller than when it has been long kept. The reason of this seems to be, that the minium still contains a considerable quantity of phlogiston, which flies off into the atmosphere by long keeping, a larger quantity of the dephlogisticated part of the atmosphere being imbibed at the same time. The mode of applying heat has also a very considerable effect on the quantity of air produced. Thus, Dr. Priestley remarks, "that from equal quantities of red lead, without any mixture of spirit of nitre, and using the same apparatus for distilling it, he obtained, by means of heat applied suddenly, more air than when slowly applied, in the proportion of ten to one. The proportion of fixed air was the same in both cases, and the remainder equally dephlogisticated." By heat alone, the Doctor found, that sedative falt, manganese, lapis calaminaris, and the mineral called lapis pendulum, silex, or tungsten, would yield dephlogisticated air; the first indeed in very small quantity, and sometimes even of a quality very little inferior to common air. In these experiments, he made use of small-bellied retorts of green glass, which can stand the fire best, containing about an ounce of water, and having narrow necks 18 or 20 inches long. The substance to be examined was put into a retort of this kind, and then exposed to a red heat, either in sand or dephlogisticated air over a melted fire, while the neck of the vessel was plunged in water or mercury.

Having dissolved six pennyweights of very clean iron in oil of vitriol, and then distilled the solution to dryness in a long-necked retort, he received the common air a little phlogisticated, some fixed air, much vitriolic acid air, and lastly 18 ounce measures of dephlogisticated air. The iron that remained undissolved weighed 23 grains, so that the air was yielded by five pennyweights one grain of iron. The ochre weighed seven pennyweights thirteen grains; that is, he there probably remained a quantity of oil of vitriol in it; and consequently, had the heat been greater, more air would have been obtained.

In his experiments with the nitrous acid, as it had constantly been found, that by pouring on more nitrous acid on the residuum, and repeating the operation, more dephlogisticated air might be obtained, the Doctor determined to try whether the fame would not hold good with vitriolic acid also. For this purpose, he added more oil of vitriol to the residuum of the last-mentioned experiment. When in a red heat with a glass retort, it yielded a quantity of vitriolic air, no fixed air, but about 24 ounce measures of dephlogisticated air; when, the retort being melted, a good deal of the air was necessarily lost; but on retaining the procefs in a gun-barrel, he procured as much air as had been got before. Pursuing these experiments, he obtained with common crust of iron and oil of vitriol, dephlogisticated air at the first distillation, and a great deal more from the residuum, by pouring fresh oil of vitriol upon it. The same produce he obtained from blue vitriol, solution of copper in the vitriolic acid, and from a solution of mercury in that acid. On this substance he remarks, that "either by means of oil of vitriol or spirit of nitre, it yields a great quantity of dephlogisticated air; but with this difference, that in the procefs with spirit of nitre, almost the whole of the air was recovered, but not more than a twentieth part of it being lost, if the procefs be conducted with care, in that with vitriolic acid, almost the whole is lost."

From the later experiments of Mr. Lavoisier, however, it appears that the Doctor's processes had not been conducted with sufficient care; as from two ounces of the dry salt formed by a combination of vitriolic acid with mercury, the former obtained 6 drachms 12 grains of running mercury, besides 3 drachms 58 grains of mercurial sublimate of two different colours. Dephlogisticated air was likewise obtained from pure calx of tin, or putty, mixed with oil of vitriol; but none in any trial with the marine acid, excepting when it was mixed with minium, in which case the air obtained was probably that which the minium would have yielded without any addition.

That all thee, and innumerable other experiments made by philosophers in different countries, was, that dephlogisticated air may be obtained from a vast variety of mineral and metallic substances by means of the vitriolic and nitrous acids. It now remains only How to discover in what manner this fluid, so essentially necessary to the support of animal life, is naturally produced.
AEROLOGY.

Deplagnoticated Air.

Deplagnoticated air itself was known. Dr Priestley, after having tried various methods of purifying contaminated air, found that, if some kinds of vegetables answered this purpose very effectually; for which discovery he received the thanks of the Royal Society. Among the vegetables employed on this occasion, he found mint answer the purpose very effectually. "When air," says he, "has been rendered perfectly clear by means of mint, so as to smell through the water, seeds of mint have frequently died upon being put into it, their leaves turning black; but if they do not die presently, they thrive in a most surprising manner. In no other circumstances have I seen vegetation so vigorous as in this kind of air, which is immediately fatal to animal life. Though these plants have been crowded in jars filled with this kind of air, every leaf has been full of life; fresh shoots have branched out in various directions, and grown much faster than other similar plants growing in the same exposed in common air."—Having in consequence of this observation rendered a quantity of air thoroughly phlogisticated, by means of mint breathing and dying in it, he divided it into two receivers inverted in water, introducing a sprig of mint into one of them, and keeping the other receiver unsealed. About eight or nine days after, he found that the air of the receiver into which he had introduced the sprig had become resipile; for a mouse lived very well in this, whereas it died the moment it was put into the other.

From these experiments the Doctor at first concluded, that in all cases the air was ameliorated by the vegetation of plants; but even in his first volume he observes, that some experiments of this kind did not answer so well towards the end of the year as they had done in the hot season; and a second instance, which he had so well towards the end of the year as they had done in the hot season; and a second instance, which he had

Noxious air improved by vegetation mint.

Experiments seemingly contradictory.

Noxious air, which he had supposed to be an essential requisite in conducting such a process.

At the time that Dr Priestley made these experiments, he supposed that the air was ameliorated merely by the absorption of phlogiston from that which had been tainted; but the experiments of Dr Ingenhousz, made in 1779, showed that this was accomplished, not only by the absorption just mentioned, but by the e-Deplagnoticenation of deplagnoticated air. He observed in general that plants have power of correcting bad air, and even of improving common air in a few hours, when exposed to the light of the sun; but, in the night-time, or when they are not induced by the solar rays, they contaminate the air. This property, however, does not belong in an equal degree to all kinds of plants: nor is it possible to discover by the external properties of a plant, whether it be fit for this purpose or not; as some which have a bad smell, and are entirely unfit for food, show themselves much superior to others whose external appearance would seem preferable. His method of making the experiment was, to fill a vial with air, fouled either by respiration or combustion; after which a sprig of any plant was introduced, by pulling it through the water in which the vial was immersed. The vial was then stopped; or it was removed into a small basin of full of water, and exposed to the sun, or situated in some other proper place as occasion required. Air phlogisticated by breathing, and in which a candle could not burn, after being exposed to the sun for three hours, with a sprig of peppermint in it, was so far corrected, as to be again capable of supporting flame.

The following experiment, however, made with a mustard plant, may be looked upon as decisive: A plant of this kind was put into a glass receiver containing common air, and its stem cut off even with the mouth of the receiver. The vessel was then inverted in an earthen pan, containing some water to keep the plant alive, and the whole apparatus was set over-night in a room. Next morning the air was found so much contaminated, that it extinguished the flame of a wax taper. On exposing the apparatus to the sun for a quarter of an hour, the air was found to be somewhat corrected; and after an hour and a half it was so far improved, that by the test of nitrous air it appeared considerably better than common air.

Before we proceed farther in the account of Dr Ingenhousz's experiments, it will be necessary to relate some observations made by Dr Priestley; from which it appears, that dephlogisticated air, in very considerable quantity, may, in certain circumstances, be procured from water alone. The substance of these is, that water, especially pump-water, when exposed to the light of the sun, emits air slowly; but after some time a green matter appears on the bottom and sides of the glass; after which it emits very pure air in great quantity, and continues to do so for a very long time, even after the green matter has shown some symptoms of decay by becoming yellow. He observed, that the water which naturally contained the greatest quantity of fixed air, yielded also the greatest quantity of that which was dephlogisticated; but that the quantity of the latter much exceeded that of the fixed air contained even in any water. The light of the sun was found to be an essential requisite in the formation of this air, as very little, and that of a much worse quality, was produced in the dark.

As the green matter produced in Dr Priestley's glass was by himself, as well as others, considered as belonging to the vegetable kingdom, Dr Ingenhousz improved upon his process, by putting the leaves of plants into water, and exposing them to the sun. All plants from the leaves of
A E R O L O G Y.

Sect. III.

After the publication of Dr Ingenhouz's experiments, it became generally believed, that the atmosphere was mitigated by the common process of vegetation, and that plants absorbed the phlogistic part as means.

Sir Benjamin Thompson, in his founder's experiment, they found that the pure dephlogisticated air was an excrement, which is just the reverse of what happens to animals, who absorb the pure part in respiration, and reject the phlogistic.

In the Philosophical Transactions for 1787, however, we find a number of experiments related by Benjamin Thompson, which seem to render this matter dubious. One very considerable objection is, that the green matter, already mentioned in Dr Priestley's experiments, when carefully observed by a good microscope, appears not to be a vegetable, but of an animal nature.

The colouring matter of the water, says he, is evidently of an animal nature; being nothing more than the affumblage of an infinite number of very small, active, oval-formed animalcules, without any thing resembling tremella, or that kind of green matter or water-moss which forms upon the bottom and sides of the vessel when this water is suffered to remain on it for a considerable time, and into which Dr Ingenhouz supposes the animalcules above mentioned to be actually transformed.

This gentleman has also found, that several animal substances, as well as vegetables, have a power of separating dephlogisticated air from water when exposed to the light of the sun, and that for a very great length of time. Not that the same quantity of water will always continue to furnish air; but the same substance being taken out, washed, and again put into fresh water, seems to yield dephlogisticated air, without any kind of limitation.

Raw silk possesses a remarkable power of this kind. To determine it, Sir Benjamin introduced 30 grains of this substance, previously washed in water, into a thin glass globe 4 inches in diameter, having a cylindrical neck 3 inches of an inch wide, and twelve inches long, inverting the globe into a jar filled with the same kind of water, and exposing it to the action of the sun in the window. It had not been ten minutes in this situation, when the silk became covered with an infinite number of air-bubbles, gradually increasing in size till, at the end of two hours, the silk was boiled up, by their means, to the top of the water. By degrees they began to separate themselves, and form a collection of air in the upper part of the globe; which, when examined by the test of nitrates air, appeared to be very pure. In three days she had collected 3 cubic inches of air, into which a wax-taper being introduced, that had just been blown out, the wick only remaining red, it instantly took fire, and burned with a bright and enlarged flame. The water in the globe appeared to have lost something of its transparency, and had changed its color to a very faint greenish cast, having at this time a very pungent flavor to me.
AEROLOGY.

153

DEPHLOGISTICATION.

Sect. III.

Dephlogisticated air, at the same time acquired the fonnell of raw silk. This was several times repeated with fresh water, retaining the same silk, and always with a smaller result; but with this difference, that when the fun's rays were very bright, the quantity of air produced was not only greater, but its quality superior to that yielded when the fun's rays were feeble, or when they were frequently intercepted by flying clouds. "The air, however, (says he), was always not only much better than common air, but even than that produced by the fresh leaves, plants exposed in water to the fun's rays, in the experiments of Dr. Ingenhousz; and, under the most favourable circumstances, it was to good, that one measure of it required four of nitrous air to saturate it, and the whole five measures were reduced to 0.35.'

An experiment was next made in order to determine the effect of darkenss upon the production of air: and in this case only a few considerable bubbles were formed, which remained attached to the silk; nor was the cafe altered by removing the globe into a German stove. Some single bubbles, indeed, had detached themselves from the silk and ascended to the top, but the fun's rays were too small to be measured or proved. — The medium heat of the globe, when exposed to the fun's rays, was about 90° of Fahrenheit, though sometimes it would rise as high as 96°; but air was frequently produced, when the heat did not exceed 65 and 70°. On reverting this experiment, in order to try the effect of light without heat, it was found that by plunging the globe into a mixture of ice and water, which brought it to the temperature of about 30° of Fahrenheit, the produce of air was diminished, though it still continued in considerable quantity.

The effect of artificial light, instead of that of the fun, was next tried. For this purpose all the air was removed from the globe; and its place being supplied with a quantity of fresh water, so as to render it quite full, it was again inverted in the jar, and removed into a dark room surrounded with fix lamps and reflectors; fix was candles were also placed at different distances from three to six inches from it, and disposed in such a manner as to throw the greatest quantity of light possible upon the silk, taking care at the same time that the water should not acquire a greater heat than 90°.

In this situation the fun began to be covered with air bubbles in about ten minutes; and in six hours as much was collected as could be proved by nitrous air, when it was found to be very pure. A fresh-gathered, healthy leaf of a peach-tree, and a stem of the pea-plant with three leaves upon it, furnished air by exposure to the fun's rays; but in smaller quantities than by the action of the fun's rays. The air produced in the dark, in whatever manner procured, was always in too small a quantity to be measured.

In making these experiments, it was found somewhat troublesome to invert the globes in water, they were at last only kept in an inclined posture on the table, as represented in Pl. X. fig. 1, the air collecting itself in the upper part of the bottle. Having provided himself with a number of globes of different sizes, he then proceeded in his experiments in the following manner.

Finding that raw silk, exposed to the action of light, produced a great quantity of air, he was induced to try whether some other substances might not be found out capable of doing the same. Having therefore provided six globes of 47 inches in diameter, and filled them with dephlogisticated air, he introduced into each of them 15 grains of one of the following substances, viz. sheep's wool, cider-down, fur of a Ruman hare, cotton wool, lint, or the ravelings of linen yarn, and human hair.

The results of these experiments were, 1. The globe containing the sheep's wool began to yield air in three days; but several days of cloudy weather intervening, he did not remove it for some time, when only 1 part of an inch of air was collected, which proved very pure when tried with nitrous air: but the wool, even in the most favourable circumstances, never afforded more than one third of the quantity which would have been yielded by silk. 2. The water with the cider-down began to furnish air almost immediately, and continued to do so in quantities little less than had been furnished by the silk, and nearly of the same quality.

One cubic inch and three quarters of this air, furnished the eighth day from the beginning of the experiment, with three measures of nitrous air, was reduced to 1.34. 3. The fur of the hare produced more air than the wool, but less than the cider-down. Two cubic inches of air were collected in four days; which made its appearance in a different manner from that of the other substances, the air-bubbles being at considerable distances from one another, and growing to an uncommon size before they detached themselves from the fur. The cotton yielded a considerable quantity of air of a better quality than any of the former. The ravelings of linen were very slow in furnishing air, and produced but a small quantity; only two cubic inches being collected in the space of a fortnight. This substance appeared to be the very reverse of the hare's fur, for the air, instead of attaching and collecting itself about the substance in large bubbles, scarce ever made its appearance in sufficient quantity to raise it to the top of the water. The human hair furnished still less than the linen, and the produce was of inferior quality, though still superior to the common atmosphere.

In order to discover the comparative fineness of air produced from vegetables and from raw silk, a small quantity of air from the stem of a pea-plant, which had four healthy leaves upon it, was proved with nitrous air, and found greatly inferior to that from raw silk and several of the substances already mentioned. An entire plant of housewort, of a moderate size, furnished only 5ths of a cubic inch of air in seven hours, and that greatly inferior to common air; but the leaves alone afforded a much greater quantity, and of a quality greatly superior.

Having proceeded thus far, it was next determined of the to ascertain how much air a given quantity of water quantity would yield by exposure to the sun's rays. For this purpose, a globe of fine white, clear, and very thin glass, containing 266 inches, being filled with fresh spring water, and 30 grains of raw silk immersed in it, was exposed to the air for three days in the month of May, but for the most part cold and cloudy. During this time only 95 inches of air were produced; but next day, by exposure to the sun from nine in the morning till five in the afternoon, the weather being very fine, 8.46 inches more were produced. The water had now assumed a light greenish colour. Next day, the produce of air was nine cubic inches, of a better quality; and the day following, six inches still more.
to be nearly equivalent to that of water; and, by a
comparative view of the two through a microsco-
pic, the surfaces appeared to be as 1000 to 3468. By
proceeding in this calculation, it appeared that the surface
of 30 grains of the cotton could not be less than 6600
square inches, while that of a like quantity of the silk
amounted to no more than 476. Hence it evidently
appeared, that the produce of air from the two sub-
fances was neither in proportion to their weights nor
their surfaces. It appeared also, that the quality of
the air produced at first was considerably inferior to that
yielded sometime afterwards. In order to ascertain
the times at which air of the best quality was produ-
ced, &c. the following experiments were made: 1. At
what times air of the best quality is produced.

(A) In all these experiments, the quality of the atmospheric air is supposit to be 100.
bodies, used in the foregoing experiments, actually did not contribute any thing, considered as chemical substances, in the process of the production of pure air yielded by water; but if, on the contrary, they acted merely as a mechanical aid in its separation from the water, by affording them a convenient surface for air to attach itself to; in this case, any other body having a large surface, and attracting air in water, might be made use of instead of the silk in the experiment, and pure air should be furnished, though the body should be totally incapable of communicating anything whatever to the water.

With a view to ascertain this, the large globe being made perfectly clean, and filled with spring-water, he introduced into it a quantity of the fine thread of glass commonly called sfum, glafis, such as is used for making a brush for cleaning jewels, and an artificial feather fold by Jew pedlars. The result of the experiment was, that the globe being exposed to the sun, air-bubbles began almost instantly to make their appearance on the surface, and in four hours 0.77 of a cubic inch of air was produced, which, with nitrous air, showed a quality of 88; after which, not a single globe more was procured, though the globe was exposed for a whole week in fine sunshine weather. Hence it appears, that something more than mere surface was wanted to produce dephlogisticated air from water by means of the sun’s light.

The following experiments were made with a view to determine the quantity and quality of air produced by means of the heat and light of the fun from water alone. A large jar of clear glass, containing 455 cubic inches, being washed very clean, was filled with fresh spring-water, inverted in a glass basin of the same, and exposed to the weather for 28 days. At the same time, another similar jar was filled with water taken from a pond in a garden in which many aquatic plants were growing, and exposed in the same place, and during the same period. The latter began to yield air in pretty large quantities on the third day, and continued to do so till the 14th; the former yielded little or none till the 14th; when it began to emit air, and continued to do so till the 22d. On removing the air produced, that from the spring-water was 14 inches in quantity, and 138 in quality; but from the pond water, 51 in quantity, and 252 in quality. The colour of the water was not changed; but both of them had deposited a considerable quantity of earth, which was found adhering to the surfaces of the glasses basins in which the jars were inverted. As these basins, however, were very thick, and consequently had but little transparency, the sediment of the water was in a great measure deprived of the benefit of the sun’s light; the experiment was therefore repeated with the following variation: In a large cylindrical jar of very fine transparent glass, 10 inches in diameter and 12 inches high, filled with spring-water, a conical jar, 91 inches in diameter at the bottom, and containing 244 inches, was inverted, and the whole exposed to the sun for 21 days. Little air was furnished till the 7th day, when the liquor assumed a greenish cast, and a fine filmy sediment of the same colour, the green matter of Dr Priestley, beginning to be formed on the bottom, air was generated in abundance, and was furnished in pretty large quantities till the 18th, when it entirely ceased. The whole amounted to 40 cubic inches, and dephlogisticated the quality 213.

The air of the following experiments was contained in Sir Benjamin Thompson’s letter to Sir Joseph Banks. In his postscript he observes, that as he never was thoroughly satisfied with the opinion of Dr Ingenhousz, that the dephlogisticated air was elaborated in the vessels of the plant, he found his doubts rather confirmed than diminished by the experiments above related. That the fresh leaves of certain vegetables (fays he) exposed to water to the action of the sun’s rays, cause a certain quantity of pure air to be produced, is a fact which has been put beyond all doubt: but it does not appear to me by any means so clearly proved, that this air is ‘elaborated in the plant by the powers of vegetation’—dephlogisticated or fixed air being received by the plant as food, and the dephlogisticated air rejected as an excrement: for besides that many other substances, and in which no elaboration or circulation can possibly be supposed to take place, cause the water in which they are exposed to the action of the light to yield dephlogisticated air as well as plants, and even in much greater quantities, and of a more eminent quality, the circumstances of the air, the vegetable, which, accustomed to grow in air, are separated from its stem and confined in water, are so unnatural, that I cannot conceive that they can perform the same functions in such different situations.

Among many facts which have been brought in support of the received opinion of the elaboration of air in the vessels of plants, there is one upon which great stress is laid, which, I think, requires further examination. The fresh healthy leaves of vegetables, separated from the plant, and exposed to water in the action of the sun’s rays, appear, by all the experiments which have hitherto been made, to furnish air only for a short time. After a day or two, the leaves, changing colour, cease to yield air. This has been conceived to arise from the powers of vegetation being destroyed, or, in other words, the death of the plant: and from hence it has been inferred, with some degree of plausibility, not only that the leaves actually retained their vegetative powers for some time after they were separated from their stalk; but that it was in consequence of the exertion of those powers, that the air yielded in the experiment was produced.

"But I have found, that although the leaves, exposed in water to the action of the light, actually do cause fresh air after a certain time, yet that they retain their property of emitting air, after the sun; and it is not the supposition that the air is elaborated in the vessels of the plant that is the matter in question.”

In confirmation of this doctrine, the globe of 46 inches was filled with fresh spring-water, and two peach-leaves were exposed for 10 days to the sun. In four days the water seemed to be entirely exhausted; but, next day, the water acquired a greenish colour, and again produced air pretty plentifully, which appeared in bubbles on the leaves; and on the 6th day, 0.34 of a cubic inch of air was produced, of the quality 222. Next day it yielded 1.5 cubic inches, of the quality 291. The three succeeding days it yielded 1.8 cubic inches, of the quality 307; after which an end was put to the experiment.
AEROLOGY.

Sect. III.

All phlogistic processes are promoted much better by dephlogisticated than common air. Dr Priestley tincted air, put a quantity of pyrophorus into one of the small jars used for making experiments upon air in quinoline; he then filled up the tube of the jar, inverted it in a basin of the same, and threw in dephlogisticated common air at different times. It always occasioned a sudden with pyrotechnic and vehement action, like the flashing of gun-powder. Phosphorus, and the air was greatly diminished.

It has been, almost throughout all ages, believed that combustion in every instance diminished common air is not air, or reduced it to a smaller volume: but the late experiments of Mr Lavoisier have shown, that this is a mistake; and that in ordinary processes attended with the production of fixed and phlogisticated air, the quantity of vapour produced is equivalent to that absorbed, or otherwise made to disappear during the operation. With dephlogisticated air the candle is very different. Mr Lavoisier having introduced a burning candle into a glass jar filled with very pure air obtained from calcinated mercury, a great heat took place, and the air was extinguished, which at first expelled a small quantity of the air; but afterwards, when the candle was extinguished, it was found that two-thirds of the bulk of air employed had been converted into fixed air, or a quantity of this kind of air equivalent to the former had been produced. The remainder, after taking up the fixed air by caustic alkali, was still as pure as before. In the common processes, he observes, that not more than one-tenth of the air employed is converted into fixed air. In this experiment, the superior gravity of fixed air is, and the consequent condensation of the other, must undoubtedly have produced some diminution in the volume of air, though Mr Lavoisier does not take notice of it. In other cases, however, the diminution is much more perceptible. Mr Scheele having introduced some live coals into a mattrass filled with dephlogisticated air, found that it was diminished by one-fourth of its quantity. Repeating the experiment with sulphur, the flame became larger and more vivid than in common air, and three-fourths of its quantity were lost. Putting a piece of phosphorus into seven ounce-measures of this kind of air, stopping the mouth of the bottle with a cork, and setting fire to the phosphorus within it, the phial broke to pieces, as soon as the flame was extinguished, by the pressure of the external air. Repeating the experiment with a stronger vial, and opening it afterwards under water, the fluid rushed into it in such a manner as almost to fill it entirely. This extraordinary diminution was also perceived on setting fire to inflammable air in the dephlogisticated kind. The way in which he accomplished this was, by filling a vessel with that fluid, dephlogisticated, and inverting it over a phial containing an effervescent mixture of vitriolic acid and iron-fillings plunged into a vessel of hot water, and furnished with a flinten tube reaching above the surface of the vessel, as represented Plate X. fig. 2. The inflammable air issuing from the orifice of the small tube, was set on fire previous to the inversion of the mattrass, and the mouth of the latter immerged in the water; on which that fluid soon began to rise, and continued to do till seven-eighths of the vessel were full. In cases of slow combustion, where common air is diminished and phlogisticated, the dephlogisticated kind was found to be almost entirely
Deephlogified air.

61 Phenomena of deephlogificated air.

The purity of deephlogificated air is ascertain'd by its degree of diminution with nitrous acid; which, like that of the diminution by liver of sulphur, or otherwise, is to be considered as a phlogistic process, or kind of burning, especially as a considerible degree of heat is thereby generated. Very great differences are perceived in this respect; and according to the quantity of diminution, the air is said to be two, three, or four times better than common air. It is not yet accurately determin'd how far this proportionable purity extends. Dr Prieſley mentions some extracted from red lead five times as pure as common air. Another quantity, produced from a solution of mercury in nitrous acid, was so pure, that one measure of it mixed with two of nitrous air, which had been obtained in the first part of the same process, occupied only 0.02 of a measure. Repeating the experiment (says he), I found, that two measures of nitrous air were rather more than sufficient to saturate one measure of the deephlogificated air; so that possibly, had the former experiment been made with more circumſpection, the diminution, extraordinary as it was, would have been somewhat greater. Indeed it cannot be fuppofed, that exactly two measures of nitrous air should be the precise quantity that would afford the greatest diminution. It should also be consider'd, that a small portion of air might be yielded by the water in which the experiments were made. Upon the whole, therefore, I am inclin'd to think, that, were it poſsible to make both the deephlogificated and nitrous air in the greatest purity, and then to mix them in some exact proportion, the aerial form of them both would be deftroy'd, the whole quantity seeming to disappear, as in the mixture of alkaline and acid air.

Notwithstanding this great degree of purity, the best deephlogificated air is capable of being contaminat'd by some of the procefses which affect the common air of our atmosphere. Dr Prieſley having introduc'd a quantity of very dry, clean nails, into a receiver fill'd with deephlogificated air, and invert'd it in quickſilver, found, that about nine months after, one tenth of the whole quantity had disappear'd, tho' he could not perceive any luft upon the nails. The effects of combination have already been relate'd, viz. as producing a great quantity of pure fix'd air; but putrefaction and animal respiration probably contaminate it in a manner similar to that of atmospheric air, though few or no experiments seem to have been made on this subje&. Mr Cavallo, however, informs us, that "when an animal is confin'd in a quantity of deephlogificated air, and is kept therein till it dies, that air is not render'd so bad but that it will still be capable of considerable diminution by nitrous air. This seems to show, that deephlogificated air is somewhat different from pure common air; or that common air is originally different from deephlogificated air, lower'd by the addition of phlogiston. The phenomenon is certainly very remarkable; and sometimes a quantity of deephlogificated air, after having been breath'd by an animal till it died, will appear by the nitrous efl to be even better than common air. When the expe-

Dr Prieſley's first hypothesis.

§ 3. Of the Composition of Deephlogificated Air. — When Dr Prieſley firſt discover'd the eſtistence of this fluid, having found that it was always procur'd by means of earthy subſtances; and that as it came over, the bubbles appeared full of white powder; he conclude'd, that it is compoſed of the nitrous acid and earth, with as much phlogiston as is necessary to its elafiſcity; and that the common atmosphere has as much more as is necessary to bring it into the mean condition in which we find it. It was not long, however, before this theory met with opposition. Dr Prieſley himself, though induc'd, from the waft of the foil matter used in his experiments, to conclude that the air contained some quantity of earth, was nevertheless unable, by any method he could think of to ascertain that quantity. His experiments were oppoſed by others made by Lavoifier; who infift'd, that when solution of mercury was carefully distilled, the metal was obtained in full quantity, or with scarce any loss, notwithstanding the deephlogificated air produc'd. This gentleman having put two ounces and one drachm of mercury into red precipitate, and afterwards reduc'd it, left a very few grains of the metal; which, he says, might be the weight of a little red matter that was found adhering to the neck of the vessel. The same thing was observ'd by Mr Fontana, who repeated the experiment often with less than a grain
Earth cannot be proved to exist in dephlogisticated air.

Whether the nitrous acid enters its composition.

AEROLOGY. Sect. III.

Dephlogisticated air.

grain weight of loss. The vessel he used had a neck of about two feet long; and he particularly remarks, that, in order to succeed in this experiment, the fire should be managed with very great dexterity; for if it be too strong, part of the precipitate will be volatilized, and then the result of the experiment is precarious.

These experiments were opposed by others made by Dr Priestley, who, in several trials found that a considerable quantity of the metal was always lost; in one of these experiments, out of 11 pennighty weights 10 grains of mercury, the loss amounted to one pennyweight two grains. In another experiment, 88 grains were lost, out of a quantity of red precipitate, in the preparation of which half an ounce of mercury had been employed. The quantity of mercury lost in his experiments, or rather the proportion of it to that of the metal employed, was always various, and the difference not very small; whence Mr Cavallo and others, with great appearance of reason, conclude, that the true reason of any perceptible loss was the strong heat made use of in the distillation, and consequently that there is no reason to suppose that any earth exists in dephlogisticated air.

The next question was, Whether any of the nitrous acid existed in dephlogisticated air! That it contains none in a proper state of acidity, is indeed evident from many decisive experiments; but an idea was naturally entertained, that in the formation of dephlogisticated air the nitrous acid was decomposed, and part of it entered into the composition of the aerial fluid. This gave rise to the theories of Mr Lavosier and Mr Kirwan, which are noticed under the article Acid; as also the experiments of Mr Watt, which tended to show that no nitrous acid was destroyed in the composition of dephlogisticated air. To these Mr Kirwan replied in the manner related in that article. We shall here, however, give a quotation from Dr Priestley as a kind of addition to Mr Watt's testimony on this head, so that the reader may be the better able to determine the weight of the evidence on both sides.

"At Mr Watt's request (says he), I endeavoured to ascertain the quantity of acid that was expelled from nitre, in procuring the dephlogisticated air from it. To do this, I put two ounces of purified nitre into a glas retort, and receiving the air in 300 ounce measures of water, only filled each recipient half full, and agitated the air very much in the water, in order to make the fluid imbibe as much as possible of the acid it contained. Notwithstanding this agitation, however, every vessel of the air retained a strong smell of the acid. The moment the air ceased to come, I filled a large phial with the water, and carried it to Mr Watt, who carefully examined it; and in a paper which he presented to the Royal Society, and which is published in the Philosophical transactions, he has given an account of the quantity of acid that was contained in all the 300 ounces of water: whence it may be fairly inferred, that there was no occasion to suppose that any of the acid entered into the composition of the air; but that it was all either rendered volatile or retained in the water. On the other hand, the Abbé Fontinana informs us, that, in distilling an ounce of nitre with a strong heat, in order to expel dephlogisticated air from it, only a few grains of weak nitrous acid are obtained, more or less as the fire applied is weak or strong; but that the quantity of dephlogisticated air extracted from it follows the contrary rule, being greatest when the heat is most violent and suddenly applied, and less when the fire is gradually applied.

On calcining metals in dephlogisticated air, very singular phenomena are observed, which seem to throw great light upon the composition of this fluid. "One of the most simple of all phlogistic processes (says Dr Priestley), is that in which metals are melted in dephlogisticated air. I therefore began with this, with a view to ascertain whether any water be produced when the air is made to disappear in it. Accordingly, into a glas vessel, containing seven ounce-measures of pure dephlogisticated air, I introduced a quantity of iron turnings, which is iron in thin small pieces, exceedingly convenient for these and many other experiments, having previously made them, together with the vessel, the air, and the mercury by which it was confined, as dry as I possibly could. Also to prevent the air from imbibing any moisture, I received it immediately in the vessel in which the experiment was made, from the proces of procuring it from red precipitate, so that it had never been in contact with any water. I then fixed the iron by means of a burning lens, and presently reduced the seven ounce-measures of iron air to 0.65 of a measure; but I found no more water after this process than I imagined it had not been possible for me to exclude, as it bore no proportion to the metals. Examining the precipitate, I found one-fifth of it to be fixed air; and when I tried the purity of that which remained by the test with nitrous air, in the proportions which one-fifth was fixed air, and the residuum was made use of in the distillation, and consequently that there is no reason to suppose that any earth exists in dephlogisticated air. For though it was more impure than I suppose the air with which I began the experiment must have been, it was not more so than the phlogistic processes of the seven ounce-measures, which had not been affected by the process, and which must have been contained in the residuum, would necessarily make it. In this case, one measure of this residuum, and two of nitrous air, occupied the space of 0.32 of a measure. In another experiment of this kind, ten ounce-measures of dephlogisticated air were reduced to 0.8 of a measure, and by washing in lime-water to 0.38 of a measure. In another experiment, 7/9 ounce-measures of dephlogisticated air were reduced to half an ounce-measure, of which one-fifth was fixed air, and the residuum was quite as pure as the air with which I began the experiment; the test with nitrous air, in the proportions abovementioned, giving 0.4 in both cases.

"In these experiments the fixed air must, I presume, have been formed by the union of the phlogiston from the iron and dephlogisticated air in which it was ignited; but the quantity of it was very small in proportion to the air which had disappeared; and at that time I had no suspicion that the iron, which had been melted and gathered into round balls, could have imbied it; a melting heat having been sufficient, as I had imagined, to expel every thing that was capable of affaining the form of air from any substance whatever. Serpentine, however, that such a quantity of air must have been imbied by something, to which I have given a very perceptible addition of weight, and

Seeing...
Dephlogisticated Air.

When this cast iron was melted in the bottom of a deep glass receiver, in order to collect all the particles that were dispersed, they firmly adhered to the glass, melting it superficially, though without making it crack, so that it was still impossible to collect and weigh them. However, I generally found, that, notwithstanding the copious dispersion, what remained after the experiment rather exceeded than fell short of the original weight of the iron.

Formation of water from dephlogisticated and inflammable air.

On attempting to revive this calx of iron in inflammable air, a very new and unexpected appearance took place. Having put a piece of iron saturated with pure air into a vessel filled with inflammable air confined by water, the inflammable air disappeared and the metal was revived; but on weighing it, he found that 2.7 ounces of inflammable air which had vanished. Considering all these circumstances, the Doctor had now no doubt that the two kinds of air had united and formed either fixed air or water; and with a view to determine this point, he repeated the experiment in a vessel where the inflammable was confined by mercury, both the vessel and mercury having been previously made as dry as possible. In these circumstances he had no sooner begun to heat the iron, than the air was perceived to diminish, and at the same time the inside of the vessel to become cloudy, with particles of dew that covered almost the whole of it. These particles by degrees gathered into drops, and ran down in all places, excepting those which were heated by the sunbeams. On collecting the water produced in this experiment, by means of a piece of filtering paper carefully introduced to absorb it, he found it to be as nearly as possible of the same weight with that which had been lost by the iron; and also in every experiment of this kind, in which he attended to the circumstance, he found that the quantity of inflammable air which had disappeared was about double that of the dephlogisticated air set loose in the operation, supposing that weight to have been reduced into air. Thus, at one time, a piece of this flag absorbed 5.4 ounces of inflammable air, while it lost the weight of about 3 ounces of dephlogisticated air, and the water collected weighed two grains. Another time a piece of flag lost 1.5 grains, and the water produced was 1.7 grains. In a third case, where 61 ounces of inflammable air were reduced to 0.92 of a measure, the iron had lost the weight of 3.2 ounces of dephlogisticated air, or nearly two grains.

The Doctor having succeeded so well with iron, next experimented the calx of copper, or those scales which fly off in tens with it by hammering whilst it is red-hot; and found copper, water produced in the inflammable air in the same manner as when the scales of iron were used. On putting precipitate *per fe*, he imagined at first that water was obtained from this substance also; but on repeating the experiment to more advantage he found no more water than might be supposed to have been contained as an extraneous substance either in the inflammable air or in the red precipitate. With iron, however, the case was vastly different. As the Doctor had formerly satisfied himself that inflammable air always contains a portion of water, and also that when it has been some time confined by water it imbibes more, as so to be increased in its specific gravity by that means, he repeated the experiment with inflammable air which had not been confined by that fluid, but was received in vessel of dry mercury from the vessel in which it had been generated; and in this case the water was produced, appearance, composition as in the former experiment. Indeed (says he), the quantity of water produced, so greatly exceeding the weight of all the inflammable air, is sufficient to prove that it must have had some other source than any confluent part of that air, or the whole of it, together with the water contained in it, without taking into consideration the corresponding loss of weight in the iron.

*Footnotes*

70 Remarkable phænomena attending the melting of cast iron.

71 Formation of water from dephlogisticated and inflammable air.
AEROLOGY.

Sect. III.

About two grains, though the vessel was stopped in deplogisticated air, in a manner that no air could escape by the explosion. It is also related, that on repeating the experiment, in glass vessels, the inside of the glass, though clean and dry before, immediately became dewy, which confirmed an opinion he had long entertained, that common air deposits its moisture by phlogistication. The experiment, however, did not succeed with Mr. Cavendish, at least with regard to the loss of weight, which never exceeded the fifth part of a grain, and commonly was nothing at all. In these experiments the greatest care was taken to observe with accuracy the diminution of air by the explosion, and quality of the remainder; from which it appeared, that 423 measures of inflammable air were nearly sufficient to phlogisticate 1000 of common air, and that the bulk of air remaining after the explosion is very little more than four-fifths of the common air employed, whence it is concluded, that when they are mixed in this proportion, almost all the inflammable, and about one-fifth of the common air, lose their effusiveness, and are condensed into the dew which lines the glas.

To examine more exactly the nature of this dew, 500,000 grain-measures of inflammable air were burnt with about 20 times the quantity of common air, and the burnt air was made to pass through a glass cylinder eight feet long and three-fourths of an inch in diameter, in order to deposit the dew. The two airs were conveyed slowly into this cylinder by separate copper pipes, passing through a brass plate which stopped up one end of the cylinder; and as neither inflammable nor common air can burn by themselves, there was no danger of the flame spreading to the magazines from which they were conveyed. Each of these magazines consisted of a large tin vessel inverted into another just big enough to receive it. The inner vessel communicated with the copper pipe, and the air was forced out of it by pouring water into the outer vessel, and in order that the quantity of common air expelled should be 25 times that of the inflammable air, the water was let into the outer vessels by two holes in the bottom of the same tin pan; the whole which conveyed the water into that vessel in which a piece of copper pipe, about 25 feet as big as the other. In trying the experiments the magazines being first filled with their respective airs, the glass cylinder was taken off, and water let by the two holes into the outer vessels, till the air began to issue from the ends of the copper pipes; they were then set on fire by a candle, and the cylinder put on again in its place. By this means upwards of 135 grains of water were left in the cylinder, which had no taste nor smell, and which left no perceptible sediment on being evaporated to dryness; neither did it yield any pungent smell, during the evaporation; in short, it seemed pure water. In one of his experiments a little foamy matter was perceived, but it was found to proceed from the luting. On repeating the experiment with deplogisticated, instead of common air, the produce was nitrous acid.

The following conclusion is drawn by Mr. Cavendish from all these experiments: 'There seem two ways by which the production of the nitrous acid, in the manner above-mentioned, may be explained first, by supposing that deplogisticated air contains a little nitrous acid, which enters into it as one of the component parts;
II

Deplhlogi-

ticated Air.

79 Conclu-
sions from
the expe-

iments.

... when this acid, when the inflammable air is in sufficient proportion, unites to the phlogiston, and is turned into phlogificated air, but does not when the inflammable air is in too small proportion: and, secondly, by supposing that there is no nitrous acid mixed with or entering into the composition of dephlogificated air; but that, when the air is in sufficient proportion, part of the dephlogificated air with which it is debased is, by the strong affinity of phlogiston to dephlogificated air, deprived of its phlogiston, and turned into nitrous acid; whereas, when the dephlogificated air is not more than sufficient to consume the inflammable air, none then remains to deprive the phlogificated air of its phlogiston, and turn it into acid.—If the latter explanation be true, I think we must allow that dephlogificated air is in reality nothing but dephlogificated water, or water deprived of its phlogiston; or, in other words, that water consists of dephlogificated air united to phlogiston. On the other hand, if the former explanation be true, we must suppose, that dephlogificated air consists of water united to a little nitrous acid, and deprived of its phlogiston; but still the nitrous acid in it must only make a very small part of the whole, as it is found that the phlogificated air into which it is converted is very small in comparison of the dephlogificated air. I think the second of these explanations seems much the more likely; as it was found that the acid in the condensed liquor was of the nitrous kind, not only when the dephlogificated air was prepared from nitrous acid, but when procured from plants or turbit mineral. Another strong argument in favour of this opinion is, that dephlogificated air yields no nitrous acid when phlogificated by liver of sulphur; for if this air contains nitrous acid, and yields it when phlogificated by explosion with inflammable air, it is very extraordinary that it should not do so by other means. But what forms a stronger, and, I think, almost decisive argument in favour of this explanation, is, that when the dephlogificated air is very pure, the condensed liquor is made much more strongly acid by mixing the air to be exploded with a little phlogificated air. The experiments of Dr Priestley adduced were to shew in which inflammable air was supposed by Mr Lavosier to be procured from water by passing its steam through ret-hot iron tubes. It was soon discovered, however, by Dr Priestley, that this inflammable air did not proceed from the water, but from the iron of the tube: and might be obtained by transmitting aqueous vapour through charcoal or iron placed in tubes of copper, glass, or earthen ware, made red-hot, but not through those tubes by themselves. In this case, the loss of the water employed exceeded that of the inflammable air produced in the proportion of 1.3 to 2; and the iron which had thus absorbed the water, appeared exactly similar to that which had been burned in dephlogificated air in the manner already related. His conclusion from thence are these: Since iron gains the same addition of weight by being melted in dephlogificated air, and also by the addition of water when red-hot, and becomes, as I have already observed, dephlogificated, the same substance in all respects, it is evident that this air or water, as existing in the iron, is the very same thing; and this can hardly be explained but on the supposition that water consists of two kinds of air, viz. inflammable and dephlogificated.

Of these proceed, he gives the following explanation: "When iron is heated in dephlogificated air, we may suppose that, though part of its phlogiston escapes, enters into the composition of the small quantity of fixed air which is then procured, yet remains to form water with the dephlogificated air which it has imbibed, so that this calx consists of the intimate union of the pure earth of iron and of water; and therefore, when the same calx, thus satureted with water, is exposed to heat in inflammable air, this air enters into it, destroys the attraction between the water and the earth, and revives the iron, while the water is expelled in its proper form."

The whole of the Doctor's opinions on the component parts of this kind of air, however, are summed up in the following sentence in his Observations relating to Observ. and Theory.—"The only kind of air that is now thought to be properly elementary, and to consist of a simple substance, is dephlogificated air; with the addition at least of the principle of heat, concerning which we know very little; and as it is not probable that this adds any thing to the weight of bodies, it can hardly be called an element in their composition. Dephlogificated air appears to be one of the elements of water, of fixed air, of all the acids, and many other substances, which, till lately, have been thought to be simple."

The experiments of the French philosophers were of the same nature with those of Mr Cavendish, but conducted on a larger scale. The inference drawn from them was the same with that already mentioned, viz. that dephlogificated and inflammable air in all cases are the two constituent parts of water. This opinion is adopted by Mr Kirwan in his Treatise on Phlogiston. "The experiments of Mr Cavendish, and Mr Kirwan," says he, "appear to me to leave no room for doubt, that when very pure dephlogificated and inflammable air are inflamed, the product is more wat- ter (a); for when these airs are employed in the proper proportion, only 0.02 of the mixture of both airs retains its aerial form. Now it is impossible to suppute that all the water obtained pre-existent in these airs; that is, that 49 parts in 50 were mere water."

Norwithstanding these positive conclusions, however, by some of the most respectable names in England, the evidences adduced have been unsatisfactory to some French chemists; who maintain, that Mefrs Cavendish, Priestley, and Kirwan, are totally mistaken with regard to the production of water from dephlogificated and inflammable air; contending, that the water obtained had previously existed in the air, and was not originally produced in the operation. The fact, indeed, becomes somewhat dubious from some experiments related by Dr Priestley himself, and of which we shall now proceed to give an account.

X

One

(a) The experiments of Mr Cavendish shew that nitrous is the product of this case. He takes notice of the difference between the result of the French experiments and his, but ascribes it to their using inflammable air prepared from charcoal: His was from zinc.
One consequence of the hypothesis in question is evident, that if water really be produced by the dephlogistication of either dephlogisticated or common air with inflammable air, the quantity of liquid obtained ought to increase in proportion to the quantity of the two airs combined, and that without any limitation. This, however, is not the case, as Dr Prieëley has observed. He had succeeded indeed with scales of iron and copper, as has already been related; and in the experiment with the latter, the production of water was so copious, that when only 1 ounce-measures of air were absorbed, the water fell in drops on the inside of the vessel, and some of these ran down it. Water was also procured by firing dephlogisticated and inflammable air from iron by the electric spark in a close vessel, an experiment similar to those made by Mr Lavoisier at Paris. In his first experiment he put 2.75 ounce-measures of a mixture of air, of which one-third was dephlogisticated and two-thirds inflammable air from iron, in a close vessel, and, after the explosion, found in it one-tenth of a pound of moisture; but on repeating the experiment with half as much dephlogisticated as inflammable air, he could perceive no sign of moisture. The greatest difficulty, however, which he says he ever met with respecting the preceding theory, arose from his never having been able to procure any water when he revived red precipitate in inflammable air, or at least no more than might have been supposed to be contained in the inflammable air as an extraneous substance. In order to make the experiment with the scales of iron and that with the red precipitate as much alike as possible, and compare them both to the greatest advantage, he made them one immediately after the other with every circumstance as nearly the same he could. The inflammable air was the same in both experiments, and both the scales of iron and red precipitate were made as dry as possible. They were heated in vessels of the same size and form, and equally confined by dry mercury; and yet with the former, water was produced as copiously as before, viz. running down the inside of the vessel in drops, when only four ounce-measures of inflammable air were absorbed; but though he heated the red precipitate till eight ounce-measures of the inflammable air were absorbed, and only one-twentieth of an ounce-measure remained, there was hardly any sensible quantity of water produced, "certainly," says he, "not one-tenth of what appeared in the experiment with the scales of iron. In this experiment there can be no doubt but that the dephlogisticated air produced from the red precipitate mixed with the inflammable air in the vessel; and as no water equal to the weight of the two kinds of air was produced, they must have formed some more solid substance, which, in the small quantities I was obliged to use, could not be found.

The difficulty, with respect to what becomes of the two kinds of air, was not lessened by the attempts which I made to collect all that I could from repeated decompositions of inflammable and dephlogisticated air in a close vessel. As I had produced water in this process when no more than a single explosion was made at a time, I thought that by continuing to make explosions in the same vessel, the water would not fail to accumulate till any quantity might be collected; and I intended to have collected a considerable part of an ounce. And as I would know exactly what quantity of air I decomposed, I had no doubt of being able to Dephlogisticate so as to ascertain the proportion that the water and air bore to each other. With this view a mixture was made of a large quantity of air, one-third dephlogisticated and two-thirds inflammable, from iron and oil of vitriol. But though I had a sensible quantity of water at the first explosion (in each of which between four and five ounce-measures of the mixture of air were used), I was surprised to perceive no very sensible increase of the quantity of water on repeating the explosions. Having therefore expended 40 ounce-measures of the mixture, the process was discontinued; and, collecting the water with all the care that I could, I found no more than three grains, when there ought to have been eleven.

"In this process the inside of the vessel was always very black after each explosion; and when I poured in the mercury after the explosion, though there was nothing visible in the air within the vessel, there filled from the month of it a dense vapour. This was the only clue I had to continue the experiments, before I proceeded to put in more mercury in order to make another; which, if the vapour had been steam, would have been time more than sufficient to permit it to condense into water. I even perceived this vapour when I had a quantity of water in the vessel, and the explosion was consequently made over it, as well as in contact with the sides of the vessel which were wetted with it; so that, as this vapour had passed through the whole body of water when the vessel was inverted, it is probable that it must have consisted of something else than mere water. But I was never able to collect any quantity of it, though it must have been something produced by the union of the two kinds of air."

In order to collect a quantity of this vapour, he contrived an apparatus, which, by diffusing it through a thin glass vessel, he supposed would condense all the contents whether fluid or solid; but after repeating the experiment as carefully as possible, by taking 20 explosions, and repeating the whole several times over, he could find nothing in the vessel besides a small quantity of water, which, added to that in the strong vessel, came far short of the weight of the air that was decomposed.

"All the conjectures," he says, "that I can advance, Prëley's in order to explain this phenomenon is, that since foot conjectures yields pure air, part of the foot is formed by the union concerning the dephlogisticated air in the atmosphere, and the this vapour, inflammable air of the fuel; but smoke, which contains much foot, is soon diffused, and becomes invisible in the open air. Such, therefore, may be the case. The foot formed by the union of the two kinds of air, may be diffused through the air, in the vessel in which they are exploded, and be carried invisibly into the common atmosphere; which may account for my not being able to collect any quantity of it in this apparatus."

Not discouraged by this bad success, the Doctor at first attempted to collect this volatile matter by means of a funnel, quantity of water incumbent upon the mercury in the to collect it, strong glass vessel in which the explosions were made, though he had found that part of it could escape through the water. He decomposed a great quantity of the two kinds of air in these circumstances; and presently
fently found that the water became very cloudy, and
collected, and found that it remained perfectly black
upon the earthen vessel in which the water containing
it was evaporated; which would not have been the
case if the blackish matter in the water had been that
powder of mercury which is produced by agitating it
in pure water: For that black mass always became
white running mercury the moment the water was
vaporated from it. 

Air was also supposed to have the power of being
decomposed, not by the calcination of metals and many other che-

canical products, but by the mere absorbption of phlogiston.

That water in great quantities (pails) is some-
times produced from burning inflammable and dephlogi-
ficating air, is evident from the experiments of Mefirs
Cavendish and Lavoisier. I have also frequently collec-
ted considerable quantities of water in this way, though
never quite so much as the weight of the two kinds of
air decomposed. My apparatus for this purpose was the
following: Into the mouth of a large glass balloon, I
introduced a tube, from the orifice of which there
continually issued inflammable air from a vessel con-
taining iron and vitriol. This being lighted, and
fusilgated, continued to burn like a candle. Presently after
the lighting of it, the inside of the balloon always became
cloudy, and the moisture soon gathered in drops, and
settled in the lower part of the balloon. To catch
what might issue in the form of vapour, in the cur-
rent of air through the balloon, I placed the glass tube
b, in which I always found some water condensed.

It is very possible, however, that in both these modes of
experimenting, the water may be converted into
a kind of vapour, which is very different from steam,
and capable of being conveyed a great way through
air, or even water, without condensation along with
the air with which it is mixed; and on this account
it may not be possible, in either of these modes of
experimenting, to collect all the water into which
the two kinds of air may be converted. The nature
of this kind of vapour into which water may be chan-
ged, and which is not readily condensed by cold, is very
little understood, but well deserves the attention of
philosophers.

That the water collected in the balloon comes
from the decomposition of the air, and not from the
fresh air circulating through it, was evident from pla-
ning balls of hot iron in the place of the flame, and
finding that, though the balloon was as much heated
by them as by the flame of the burning of the inflam-
nable air, and consequently there must have been the
same current of the external air through it, no mois-
iture was found in the balloon."

Sect. IV. Of Phlogificated Air.

The universal prejudice in favour of the existence
of that principal named Phlogiston, first suggested by
Stahl, gave rise, on the first appearance of Dr Prie-
ffley's discoveries, to a theory, concerning the action
of this substance upon air and other bodies. As
it had been observed, that air was diminished, in
certain cases at least, by burning, universally by re-
piration, and by some other processes, it was imagi-
nated that phlogiston was a body of such a singular na-
ture, that when mixed with air, it always diminished
its bulk, instead of enlarging it, which might have been
more naturally expected from the mixture of any va-
pour whatever. It was also supposed, by some, that the
phlogiston was not only entirely devoid of gravity, but
that it was a principle of positive gravity; so that the ab-
solute weight of bodies was diminished by an union with it,
and augmented when it was expelled, though their
specific gravity was diminished. Various other surprising
properties were attributed to phlogiston: such as that of
giving elasticity to air, of constituting flame by a
chemical combination with air, &c. Its emission to the
atmosphere was supposed to be always attended with
phlogiston; a diminution of air; and therefore, all proceses
in which air was diminished and became noxious, such as
that by liver of sulphur, a mixture of iron filings and
brimstone, &c. were called phlogistic processes. Respi-
ration of animals was taken in the same account; but
neither in this, nor in combustion, was it allowed that
any kind of vital spirit was absorbed by the blood, or
separated from the air by the burning body. On the
contrary, it was strenuously argued, that all this was
performed by the emission of phlogiston from the lungs
or the inflamed substance, which deprived the air, and
diminished it in bulk; and as all air was supposed
to contain phlogiston, it was likewise imagined, that in all
cases where air was mended, as by the growing of ve-
getables, or agitation in water, the emendation was
accomplished, not by the emission of any thing into the
atmosphere, but by the mere absorption of phlogiston.

In other respects this substance was thought to be an
exceedingly powerful principle in nature; the light of
the sun itself and the electric fluid being liable to be modi-
fications of it, the different kinds of airs to be phlo-
gistic vapours, &c.; so that the whole system of nature
seemed ready to be absorbed by it at once.

The formidable powers of this principle were first
shown by the discoveries of Mr Lavoisier, though the
latter erred equally on the contrary side; and not con-
tent with keeping the phlogistic principle within due
bounds, would needs deny its existence altogether. *

In a treatise published in the year 1782, he first im-
pugns Dr Prieffley's theory of respiration, and denies that
"the resurrection of animals has the property of
phlogisticating air in a manner similar to what is effec-
ted by the calcination of metals and many other che-


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 SEE pHILOGI STIC.
AEROLOGY.

Sect. IV.

Phlogificated air.

93 Compositions of atmospheric air.

94 Effects of respiration on air.

95 Scheele's experiments.

96 Composition of atmospheric air-dephlogificated.

Phlogificated air.

97 How air is purified by agitating it in water.

98 Properties of phlogificated air.

That common air is compounded of two kinds of elastic fluids, Mr Scheele has proved by the following experiment:—I dissolved (says he) one ounce of alkaline liver of sulphur in eight ounces of water; of this solution I poured four ounces into an empty bottle, whose capacity was 24 ounces, and worked it well; then I turned the bottle, immersed its neck into a small vessel with water, and kept it in this position a fortnight; the solution had partly lost its red colour, and some sulphur had been precipitated from it during this time. After this I put the bottle in the same position in a larger vessel with water, keeping the mouth and neck under water, and the bottom of the bottle above water, and thus I drew the cork under water, which immediately rushed with violence into the bottle. On examining the quantity of water in the bottle, it was found, that during this fortnight, six parts out of 20 of air were lost. On repeating the experiment with the same materials, and in the same bottle, only four parts out of 20 were lost by standing 4 weeks, and no more than six parts after 4 months.

From these experiments, and many others similar, it appears that the doctrine of phlogiston has been carried too far by Dr Priestley and other British philosophers, and that the air consists of two kinds of fluids; one perfectly satyry, and friendly in the highest degree to animal life; the other altogether unfit for it. These two appear incapable of being converted directly into one another by any process, natural or artificial: for though both are destructible, yet they are always converted into other substances; from which indeed, either the one or the other may be extracted at pleasure by employing the proper methods. The strongest arguments in favor of the trituration of phlogificated air into that of a pure kind, were drawn from the purification of noxious air by vegetation, and by agitation in water. In the former case, however, it has been observed in the last section, that this seeming purification is no other than an exchange of the one air for the other; the vegetables absorbing the phlogificated, and emitting the dephlogificated air in its stead. With respect to the agitation in water, the matter remained more dubious; and it is only in the last volume of Dr Priestley's treatise that we have any account of this being accomplished by an emission of purer air from the water. —"In the infancy of my experiments," says he, "I concluded, that all kinds of air were brought by agitation to the same state; the purer air being partially phlogificated, and air completely phlogificated being thereby made purer; inflammable air also losing its inflammability, and all of them brought into such a state as that a candle would just go out in them. This inference I made from all the kinds of air with which I was then acquainted, and which did not require to be confined by mercury, being brought to that state by agitation in a trough of water, the surface of which was exposed to the open air; never imagining that when the air in my jar was separated from the common air by a body of water, generally about twelve inches in depth (adding that within that without the jar), they could have any influence on each other. I have, however, been long convinced, that, improbable as it then appeared to me, this is actually the case."

This remarkable fact is illustrated by the following experiments:—1. About three ounce-measures of air, phlogificated by nitrous air, was agitated for a quarter of an hour in a vessel containing 20 ounces of water, which had been boiled for several hours, and which was still very warm. By this process it became diminished one-sixth, and considerably improved in quality. The next day the remainder was agitated for another quarter of an hour, and the water which had been boiled at the same time, when it was also diminished in quantity and improved in quality. 2. An equal quantity of air, phlogificated by means of iron-filings and brimstone, being agitated for 20 minutes, was diminished one-seventh, and improved so far that a candle would burn in it. 3. After expelling all the air he could from a quantity of water by boiling, he put to it, in separate phials, air that had been phlogificated with iron-filings and brimstone, as well as that which the heat had expelled, leaving them with their mouths in water, and agitating them occasionally. On examining the phials in about two months, he found both the air that was confined by water and that which had been expelled by heat completely phlogificated. 4. That water does imbibe the purer part of the atmosphere, in preference to that which is impure, is evident, he says, from any examination of it: For if the water be clear, and free from any thing that is putrefactive, the air expelled from it by heat is generally of the standard of 1; whereas that of the atmosphere, when the nitrous air is the purest, is about 1.2. Phlogificated air is equally invisible with common air, and something more elastic. Mr Kirwan proved it by expelling air from a vessel, through a long tube, into the main air; and, by carefully placing a stop-plate upon the stem of the tube, no perceptible diminution of the atmosphere in the room could be observed.
AEROLOGY.

Phlogificated Air.

Sec. IV.

Phlogificated Air.

Nitrous acid procured from phlogificated air.

Mr. Cavendish’s experiments on the production of nitrous acid.

Nitrous acid procured from phlogificated air.

cured some perfectly phlogificated, so that it was not in the least diminished by nitrous air, from a mixture of iron-filings and brimstone. Having dried it by frequently introducing dry filtering paper under the jar that contained it, he found its weight to be that of the common air as 683 to 1000, the barometer standing at 20.44 and the thermometer at 60°. The other properties of it are, that it is extremely fatal to animal life, and friendly to that of vegetables, insomuch that it is now generally believed to be the true and proper nourishment of the latter. It seems to exist originally, in very large quantity, in our atmosphere. It may be separated from the common mafs of air by combustion, by respiration, by putrefaction, and in short by every species of phlogistic process; neither is there any other species of air but what may be converted into this by means of fire, dephlogificated air alone excepted.

Phlogificated air is now generally believed to be a combination of the nitrous acid with phlogiston; and, in its gradual progress towards this, which is its ultimate stage, it first assumes the character of phlogificated nitrous acid; then of nitrous acid, in which it is readily parts with its phlogiston to the atmosphere, or rather to the dephlogificated part of it; and lastly, it becomes phlogificated air, in which the union between the principles in so strong, that it cannot be broken by simple exposure to dephlogificated air without heat; though the experiments of Mr Cavendish show, that this may be done by means of the electrical spark, which produces the most violent heat we can imagine.

It had been frequently observed, that common atmospheric air was always diminished by taking the electrical spark in it; and this diminution was fastened to be occasioned by the phlogification of the air, and separation of its fixed part; in consequence of which it was urged, that lime-water is precipitated by taking the spark, which is its phlogiston, and that, when the part of the air contained in the exhausted vessel is again admitted to the common air, the precipitated lime-water is dissolved. Now, Mr Cavendish, however, who has carefully examined this subject, denies that any fixed air is produced in this manner; and by a set of very curious experiments, published in the 75th volume of the Philosophical Transactions, has clearly shown that nitrous acid, and not fixed air, is the product of this operation.

The apparatus used in these experiments, was that represented Plate X., fig. 4, and consists only of a crooked glass tube, whose ends are plunged into quicksilver contained in two glasses, in the middle part of which the air is confined between the two portions of quicksilver. The air was introduced by means of a smaller tube, fig. 5, the tube M of the former figure being filled with quicksilver, the bent end of which was introduced into a jar DEF, filled with the proper kind of air, and inverted in water. The end C being stopped by the finger, the quicksilver was thus prevented from falling out, let the tube be placed in what position it would, until this pressure was removed. Upon introducing the crooked tube into the jar in the position represented in the figure, and removing the finger from the orifice at C, the quicksilver would descend; and by stopping this orifice again, any quantity of the fluid may be allowed to run out, and the empty space of the tube will be filled with the air desired. Having thus got the proper quantity of air into the tube ABC, it was held with the end C uppermost, and stopped with the finger; and the end A, made smaller for that purpose, being introduced into the end of the bent tube M, the air, on removing the finger from C, was forced into that tube by the pressure of the quicksilver in the leg BC. Thus he was enabled to inflate any quantity he pleased of any kind of air into the tube M; and by the same means it was in his power to set up any quantity of soap-leys, or other liquor which he wished to be in contact with it. In one case, however, in which he wished to introduce air into the glass tube many times in the same experiment, he made use of the apparatus represented fig. 6, consisting of a tube AB, of a smaller bore, a ball C, and a tube DE of a larger bore. This apparatus was first filled with quicksilver, and then the ball C and the tube AD were filled with air, by introducing the end A under a glass inverted into water, which contained the proper kind of air, and drawing out the quicksilver from the leg ED by a syphon. A ter being thus furnished with air, the apparatus was weighed, and the end A introduced into one end of the tube M, and kept there during the experiment; the way of forcing air out of this apparatus into the tube being by thrusting down the tube ED, a wooden cylinder of such a size as almost to fill up the whole bore, and by occasionally pouring quicksilver into the same tube, to apply the place of that pulled into the ball C. After the experiment was finished, the apparatus was weighed again, which showed exactly how much air had been forced into the tube M during the whole experiment; it being equal in bulk to a quantity of quicksilver, whose weight was equal to the increase of weight of the apparatus. The bore of the tube M, used in these experiments, was about the tenth of an inch in diameter, and the length of the column of air occupying the upper part of the tube was in general from 3 ½ inches to 1 inch. In order to force an electrical spark through the tube M, it was necessary to place an inflated ball at such a distance from the conductor as to receive a spark from it, and to make a communication between that ball and the quicksilver in one of the glasses, while the quicksilver in the other glass communicated with the ground.

When the electric spark was made to pass through common air included between short columns of a solution of litmus, the solution acquired a red colour, and the air was diminished, as had been observed by Dr Priestley. When lime-water was used instead of the solution of litmus, and the spark was continued till the air could be no further diminished; but not the smallest cloud could be perceived in the water, though the air was reduced to two thirds of its original bulk; which is a greater diminution than it could have suffered by any phlogistic process, that being little more than one-fifth of the whole. The experiment being repeated with impure dephlogificated air, a great diminution took place, but without any cloud in the lime-water. Neither was any cloud produced when fixed air was let up into it; but, on the addition of a little caustic volatile alkali, a brown sediment immediately appeared.

It being thus evident that the lime was saturated by some acid produced in the operation, the experiment was repeated with soap-leys to discover the nature of it. A previous experiment had been made in order to know what degree of purity the air ought to be of to produce the greatest diminution; and thus it was found,
AEROLOGY.

Sect. IV.

Phlogfificated air.

102

103

Proportions of the different airs necessary for the production of nitrous acid.

...found, that when good deep phlogfificated air was used, the diminution was but small; where perfectly phlogifificated air was made use of, no sensible diminution took place; but when five parts of pure phlogifificated air were mixed with three of common air, almost the whole was made to disappear.—It must be remembered, that common air consists of one part of phlogifificated and four of phlogifificated air; so that a mixture of five parts of pure phlogifificated air and three of common air, is the same thing as a mixture of seven parts of phlogifificated air with three of phlogifificated.

Mr Cavenish, having made these previous trials, he introduced into the tube a little soap-leys, and then let up some phlogifificated and common air mixed in the above-mentioned proportions, which, rising in the tube M, divided the soap-leys into its two legs. As fast as the air was diminished by the electrical spark, he continued to add more of the same kind till no further diminution took place. The soap-leys being then poured out of the tube, and separated from the quicksilver, seemed to be perfectly neutralized, as they did not at all discolour paper tinged with blue flowers. On evaporating the liquor to dryness, a small quantity of salt was left, which was evidently nitre, from the manner in which a paper impregnated with the solution of it burned. On repeating the experiment on a larger scale, with five times the quantity of materials, pure nitre was obtained in proportion, and was found by the test of terra pondersa falsa, to contain no more vitriolic acid than what might have been expected in the soap-leys itself, and which is exceedingly small.

As, in some former experiments of Mr Cavenish, it had been found, that by deflagrating nitre with charcoal, the whole of the acid was converted into phlogifificated, he concluded that this kind of air is nothing else than nitrous acid united to phlogifificated; according to which, it ought to be converted into nitrous acid by being deprived of its phlogifificated. "But (says he) as dephlogifificated air is only water deprived of phlogifificated, it is plain, that adding dephlogifificated air to a body, is equivalent to depriving it of phlogifificated, and adding water to it; and therefore dephlogifificated air ought also to be reduced to nitrous acid, by being made to unite or form a chemical combination with dephlogifificated air; only the acid thus formed will be more dilute than if the phlogifificated air was simply deprived of phlogifificated.

"This being premised, we may safely conclude, that in the present experiments, the phlogifificated air was enabled, by means of the electrical spark, to unite to, or form a chemical combination with, the dephlogifificated, and was thereby reduced to nitrous acid, which united to the soap-leys, and formed a solution of nitre; for in these experiments the two airs actually disappeared, and nitrous acid was formed in their room: and as it has been shown, from other circumstances, that phlogifificated air must form nitrous acid when combined with dephlogifificated air, the above-mentioned opinion seems to be sufficiently established. And a further confirmation is, that no diminution of air is perceived when the electric spark is passed either through pure dephlogifificated or through perfectly phlogifificated air; which indicates a necessity for the combination of the two in order to produce nitrous acid. It was also found by the last experiment, that the quantity of nitre produced was the same that would Phlogifificated air have been obtained from the soap-leys, had they been caked Air, fatured with nitrous acid; which shows, that the production of the nitre was not owing to any decomposition of the soap-leys.

"The soap-leys used in the foregoing experiments were made from salt of tartar prepared without nitre, and were of such a strength as to yield one-twentieth of their weight of nitre when satured with nitrous acid. The dephlogifificated air was also produced without nitre; that used in the first experiment with the soap-leys being procured from the black powder formed by the agitation of quicksilver mixed with lead, and that used in the latter from turbit mineral. In the first experiment, the quantity of soap-leys used was 33 measures, each of which was equal in bulk to one grain of quicksilver; and that of the air absorbed was 416 such measures of phlogifificated air and 914 of dephlogifificated. In the second experiment, 178 measures of soap-leys were used; which absorbed 1920 of phlogifificated air and 4860 of dephlogifificated.

It must be observed, however, that in both experiments some air remained in the tube undecomposed, which was of the purest degree of purity I had means of trying; so that the proportion of each species of air absorbed cannot be known with much exactness.

"As far as the experiments hitherto published extend, we scarcely know more of the nature of the phlogifificated part of the atmosphere, than that it is not diminished by lime-water, caustic-alcalies, or nitrous air; that it is unfit to support fire or maintain life in animals; and that its specific gravity is not much less than that of common air; so that though the nitrous acid, by being united to phlogifificated, is converted into air poiffed of these properties; and, consequently, that the proportion of each species of air absorbed cannot be known with much exactness.

I therefore made an experiment to determine whether the whole of a given portion of the atmosphere could be reduced to nitrous acid, or whether there there was not a part of a different nature from the rest, which would refuse to undergo that change. For this purpose, I diminished a similar mixture of dephlogifificated and common air in the same manner as before, until it was reduced to a small part of its original bulk; after which some dephlogifificated air was added, and the spark continued until no further diminution took place. Having by these means condensed as much as I could of the phlogifificated air, I let up some solution of liver of sulphur to absorb the dephlogifificated air; after which only a small bubble of air remained unaborsed, which certainly was not more than one-tenth of the bulk of the phlogifificated air let up into the tube; so that if there is any part of the phlogifificated air of our atmosphere which differs from the rest, and cannot be reduced to nitrous acid, we may safely conclude, that it is not more than one-tenth part of the whole.

Though these experiments had shown that the chief cause of this diminution of airs is the conversion of the phlogifificated kind into nitrous acid, it seemed
sect. V. aeroLogy.

PhlogiLicated Air.

not unlikely, that when any liquor containing inflammable matter was in contact with the air in the tube, some of this matter might be burnt by the spark, and thereby diminish the air. In order to determine this, the electric spark was passed through phlogiLicated air included between different liquors; and the result of the experiments was, that when phlogiLicated air, containing only $\frac{1}{4}$ part of its bulk of phlogiLicated air, was confined between short columns of soap-leys, and the spark passed through it till no further diminution could be perceived, the air lost $\frac{1}{4}$ of its bulk; which is not a greater diminution than might very likely proceed from the decomposition of the small quantity of phlogiLicated air contained in it, as the phlogiLicated air might easily be mixed with a small quantity of common air while putting into the tube. When the same phlogiLicated air was confined between columns of distilled water, the diminution was rather greater than before, and a white powder was formed on the surface of the quicksilver beneath; the reason of which, in all probability, was, that the acid produced in the operation corroded the quicksilver, and formed the powder; and that the nitrous air produced by that corrosion united to the dephlogiLicated air, and caused a greater diminution than would otherwise have taken place. When a solution of litmus was used instead of distilled water, the solution soon acquired a red colour; which grew paler and paler as the spark was continued, till it became quite colourless and transparent. The air was diminished by almost one-half, and might perhaps have been further diminished had the spark been continued. When lime-water was let up into the tube, a cloud was formed, and the air was further diminished by about one-fifth; the remainder was good dephlogiLicated air. In this experiment, therefore, the litmus was, if not burnt, at least decomposed, so as to lose entirely its purple colour, and to yield fixed air; so that, though soap-leys cannot be decomposed by this process, yet the solution of litmus can, and so very likely might the solutions of many other substances be. But there is nothing in any of these experiments which favours the opinion of the air being at all diminished by means of phlogiLiton communicated to it by the electric spark.

sect. V. of fixed air.

The discovery of this kind of air is as old as Van Helmont; who gave it the name of gas fixus, from its being emitted in great quantity by burning charcoal. Subsequent discoveries showed, that a fluid of the same kind was plentifully produced by fermenting marrows; in almost every kind of combustion, and naturally generated in vast quantity in mines and coal-pits, where it is known by the name of chok-damp; that it exists in a concrete state in alkaline salts, chalk, limestone, the shells of marine animals, magnesia alba, &c. in a very large proportion, confining one-half, and sometimes more of their weights; and that it might always be extracted from the atmosphere, in unlimited quantity, by expelling certain substances to it.—On examining the nature of this fluid, it was found so manifastly acid, that it has now obtained a place among these substances under the name of aërial acid; or, more improperly, cretaceous acid, from its being Fixed Air. The fixed air is the heaviest of all permanently elastic fluids, excepting those derived from the mineral acids.

Mr Kirwan determines it to be to common air as 1000 to 10000, the barometer being at 20.85, the thermometer at 64, and the fixed air being extracted from calcareous spar by MARINE, whose specific gravity was 1.045. He observes, however, that though this air was obtained in the driest manner possible, and that the globe which contained it appeared perfectly free from moisture; yet, when carried into a room 27 degrees colder, the inside of the globe was covered with dew, which soon formed visible drops.—In its concrete state, fixed air is one of the heaviest bodies in nature.

Mr Kirwan, in the 7th volume of the Philosophical Transactions, gives an account of his ingenious method of finding the specific gravity of fixed air in its fixed state, when combined with calcareous earth, from which it appears, that fixed air, in that state, is prodigiously concentrated, and, were it possible to extract it by itself in that concentrated state, it would be the heaviest body known, gold and platinum excepted.

Mr Kirwan first ascertained the specific gravity of a piece of white marble, and then expelled the fixed air from a known weight of it finely powdered, by means of diluted vitriolic acid; the bulk and weight of the obtained fixed air being ascertained. Next, he calcined a known quantity of the same sort of marble, by keeping it in a white heat for the space of 14 hours; after which, being weighed again, and from the weight lost by this calcination, the weight of the fixed air, which must have escaped from it according to the abovementioned experiment, being subtracted, the remainder is the weight of water contained in the marble; from which experiments it appears, that 100 grains of the marble contained 32.42 grains of fixed air, 11.66 grains of water, and 55.92 grains of pure calcareous earth.

I next (says he) proceeded to discover the specific gravity of the lime. Into a brass box, which weighed 607.65 grains, and in the bottom of which a small hole was drilled, I stuffed as much as possible of the finely-powdered lime, and then screwed the cover on, and weighed it both in air and in water. When immersed in this latter, a considerable quantity of common air was expelled; when this ceased, I weighed it. The result of this experiment was as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Grains</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight of the box in air</td>
<td>607.65</td>
</tr>
<tr>
<td>Its loss of weight in water</td>
<td>72.75</td>
</tr>
<tr>
<td>Weight of the box and lime in air</td>
<td>1047.5</td>
</tr>
<tr>
<td>Weight of the lime finely in air</td>
<td>435.85</td>
</tr>
<tr>
<td>Loss of weight of the box and lime in water</td>
<td>256.5</td>
</tr>
<tr>
<td>Loss of weight of the lime finely</td>
<td>182.3</td>
</tr>
</tbody>
</table>

Hence, dividing the absolute weight of the lime by its loss in water, its specific gravity was found to be 2.3968.

From these data I deduced the specific gravity of fixed air in its fixed state; for 100 grains of marble contained 55.92 of earth, 32.42 of fixed air, and 11.66 of water; and the specific gravity of the marble is 2.717. Now the specific gravity of the fixed air, in its fixed state, is as its absolute weight, divided by its loss of weight in water; and its loss of weight in water is as
165

A E R O L O G Y.

Sect. V.

Fixed Air.

the loss of 100 grains of marble, minus the loss of the pure calcareous earth and the water.

Loses of 100 grs. of marble = 100 = 36.8 grs. 2.717

Loses of 55.92 grs. of calcareous earth = 55.92 = 23.39 grs. 2.39

Loses of 11.66 grs. of water = - 11.66

“Then the loss of the fixed air 36.8 - 23.39 = 1.75; consequently its specific gravity is $\frac{32.42}{18.52} = 1.75$.

108

Fixed air differs considerably in its properties from the airs already mentioned. Its acidity is manifest to the taste, and still more from its neutralising both fixed and volatile alkalies; which it will do in such a manner as not only to destroy their causticity, but to give them a manifestly acid taste, and will moreover enable them to form crystals of a neutral or acridulous salt. It has a considerable antiseptic power, and will even check the putrefaction of animal substances; tho' it has been observed, that in this case it acts only by absorbing the putrid effluvia already emitted from the body, and becomes itself very offensive, while it sweetens the other.

When taken into the lungs, it is equally poisonous with phlogisticated or any other noxious air, and extinguishes flame as effectually; but, when mixed with phlogisticated air, may be inspired without any danger, and even in its pure state may be swallowed in large quantities, not only without danger, but with the most favourable effects in some diseases, whence it has now become an article of the Materia Medica. As an acid it finds in the lowest rank, being expelled from alkalies by every other; though it is capable of separating oils, sulphur, and the colouring matter of Prussian blue, from the substances with which they are combined.

The origin of this acid was for a long time as much unknown as that of the others; and while the general prejudice remained that acids were a kind of primary elements unchangeable in their nature, it was supposed that fixed air was some modification of the others, probably the nitrous. But the discoveries made of late years, have abundantly shewn, that the chemical principles are by no means so indestructible as they were imagined; and that the vegetable acids particularly, may be at least totally resolved into fixed air. Hence it was naturally suggested, that fixed air itself might be a compound of some other principles; and it was suggested by Dr Black, that it was a combination of atmospheric air with phlogiston. As the air of our atmosphere, however, is compounded of two substances, one of which naturally contains no phlogiston, and the other as much as it can hold; it seemed unlikely that there should be any possibility of adding to the quantity of phlogiston contained in a portion of the atmosphere, without decomposing it in some manner or other. Succeeding experiments evinced, that it was by a decomposition of the pure part of atmospheric air, and a combination of the phlogiston and the fuel with its balsas, that fixed air was produced; and this fact was evinced by numerous experiments made by Mr Kirwan, Mr Lavosier, and Dr Priestley, so that it is now looked upon to be generally established; and as the experiments made by Dr Priestley appear fully as convincing as fixed air, any, we shall here content ourselves with giving an account of them.

The compound nature of fixed air, and the principles from which it is formed, were first discovered by Mr Loy's experiments; but Dr Priestley was not convinced by the rimes and proofs he adduced, till after making some experiments of his own. The first was, by firing thavgings of iron in dephlogisticated air; when he observed a considerable residuum of fixed air, though that in the receiver had been of the purest dephlogisticated kind, and iron could only have yielded inflammable air. The hypothesis of Mr Kirwan was still further confirmed by an experiment in which iron-filings, which could only have yielded inflammable air, were mixed with red precipitate, which is known to yield only pure dephlogisticated air. On heating these in a glass retort, they gave a great quantity of fixed air, in some portions of which nineteen-twentieths were absorbed by lime-water, and the residuum was inflammable; but when the red precipitate was mixed with powdered charcoal, which had been found to yield only inflammable air, the fixed air produced from it was so pure that only one-fourth part remained unabsorbed by water, which is as pure as that generally prepared from chalk and oil of vitriol. In some of these experiments it appeared, that three ounce-measures of dephlogisticated air went to the composition of two of fixed air: for one ounce of red precipitate gave 60 ounce-measures of dephlogisticated air; and, when mixed with two ounces of iron-filings, it gave about 40 ounce-measures of fixed air that were actually absorbed by water, besides a residuum that was inflammable. The fame proportion was obtained when half the quantity of materials were made use of; but on putting an ounce of each, only 20 ounce-measures of fixed air, including the residuum, could be got.

In considering this subject farther, it occurred to Dr Priestley, that his experiments, in which charcoal was used, lay open to an objection, that since dry wood, and imperfectly made charcoal, yield fixed air, it might be said, that all the elements of fixed air are contained in charcoal; and though this substance alone, even with the affinities of water, will not yield fixed air, this might be effected by treating it with other substances without their imparting anything to it; especially as the inflammable air procured by means of water, appears to contain fixed air when decomposed with the dephlogisticated kind. In order to expel all the fixed air from charcoal, he made a quantity of it from dry oak, and pounding it while hot, instantly mixed four measures of it with one of red precipitate, and, putting them into an earthen retort, got, with a heat no greater than what was sufficient to revive the mercury, a large quantity of air, half of which was fixed. Afterwards the proportion of fixed air was less, and at last no fixed air at all was obtained; but as the residuum was worse than the common atmosphere, he was inclined to believe, notwithstanding Mr Cavendish's experiments, that phlogisticated air may be composed of phlogiston and dephlogisticated air. In another experiment he found a better proportion of charcoal and red precipitate. This was by mixing one ounce of precipitate with the same quantity of perfect char-
AEROLOGY.

Fixed Air. — Charcoal hot from the retort in which it was made, putting these into a coated retort, he expelled from them, by a strong heat, about 30 ounce-measures of air, the whole of which was the purest fixed air, leaving only about one-fourth part unabsorbed by water, and this almost perfectly phlogilicated.

Having recollected, that in some former experiments he had obtained fixed air from nitrous acid and charcoal, he therefore repeated the experiment with some of the same charcoal which had then been made use of; when fixed air was obtained, in the quantity sometimes only of one-fifth, and sometimes of one-half; to the formation of which he supposed the phlogilicated air produced by heating the nitrous acid must have contributed. On account of the objections, however, which might be made to the use of charcoal, he next employed iron, which was liable to nothing of this kind; and on mixing an ounce of iron-fillings with as much charcoal, and then heating them in a glass retort, he obtained 20 ounce-measures of air, of which one-fifteenth remained unabsorbed by water. The residuum was the standard of 1.12, but slightly inflammable. Repeating the experiment with half an ounce of iron fillings, he got 26 ounce-measures of air, of which the first part was pretty pure, but afterwards one-tenth remained unabsorbed by water; but on mixing one ounce of precipitate with two ounces of filings, he got about 40 ounce-measures of air, of the first portions of which only one-twentieth was unabsorbed by water, though towards the conclusion the residuum was greater. In this process he got in all 30 ounce-measures of pure fixed air, completely absorbed by water, besides about four ounce-measures, which, he supposes, might have been absorbed in receiving the air and transferring it into other vessels.

Fixed air was also produced from red precipitate mixed with brass filings, with zinc, from tubercine mineral with iron filings, and from the black powder into which mercury mixed with lead is easily converted. In this latter case the Doctor supposes that the fixed air was produced from the phlogiiliated kind absorbed by the metals and the phlogiston of the lead; and this is confirmed by an observation that the fixed air always comes first in the process, when the phlogiston is most readily separated, but afterwards the produce becomes quite pure and phlogiiliated. In attempting, however, to increase the quantity of fixed air by heating this black powder in phlogiiliated air, he found only an augmentation of the quantity of phlogiiliated air, and of that pure kind.

"Perhaps," says he, "as decisive a proof as any of the real production of fixed air from phlogiston and phlogiiliated air, may be drawn from the experiments in which I always found a quantity of it when I burned sulphur in phlogiiliated air. In one of these experiments, to which I gave particular attention, six ounce-measures and an half of the phlogiiliated air were reduced to about two ounce-measures; and one-fifth of this was fixed air. When both the vitriolic acid and fixed air produced by this operation were absorbed by water, the remainder was very pure dephlogiiliated air.

I had always concluded, that no fixed air could be procured by the decomposition of inflammable air which had been produced by mineral acids, because I had not been able to do it with that which I had got by means of vitriolic acid; but I learned from Mr. Neumann, that this is peculiar to the vitriolic acid, the remainder of which, diluted through the inflammable, procured by it, he conjectures, may actually decompose the fixed air produced in the process. For, as I have hinted before, when the inflammable air is produced from iron by means of fipis of sulphur, there is a very perceivable quantity of fixed air when it is united with dephlogiiliated air. When I decomposed these kinds of air in equal quantities, they were reduced to about 0.5 of a measure, and of this not more than about one fourteenth was fixed air. This experiment, ought, however, to be added to the other proofs of fixed air being produced by the union of dephlogiiliated air and phlogiston.

"The last instance, which I shall mention, of the general production of fixed air from phlogiston and dephlogiiliated air, is of a much more striking nature than any that I have yet recited. Having made what I call charcoal of copper, by passing the vapour of spirit of wine over copper when it was red-hot, I heated a piece of it in different kinds of air. In common air, observing neither increase nor decrease in the quantity, it concluded, perhaps inaccurately, that no change was made in it: for when I repeated the experiment in dephlogiiliated air, the charcoal burned very intently, and when a part of it was consumed, which (like common charcoal in the same process, was done without leaving any sensible residuum) I found that no heat which I could apply afterwards, had any further effect on what was left of the charcoal. Concluding, therefore, that some change must be made in the quality of the air, I examined it, and found about nine-tenths to be the pure fixed air; and the residuum was such as would have been made by separating the absolutely pure part of the dephlogiiliated air, leaving all the impurities behind. — Having ascertained this fact, I repeated the experiment, weighing the piece of charcoal very carefully before and after the process; and then found, that by the loss of one grain of charcoal, I reduced four ounce-measures of dephlogiiliated air till one-ninth only remained unabsorbed by water; and again, with the loss of one grain and a half of the charcoal, I reduced six and an half-measures of dephlogiiliated air till five and an half-measures were pure fixed air. In this process there was a diminution of bulk after the experiment, as might have been expected from the change of the air into one of a heavier kind by means of a substance or principle that could not add much to the weight of it. In one of the experiments, 4.3 ounce-measures of dephlogiiliated air were reduced about one-thirtieth part of the whole; and in this case, when the fixed air was separated by water, there was a residuum of 0.75 of a measure of the standard of 1.0, whereas the dephlogiiliated air, before the experiment, had been of the standard of 0.2.

"That dephlogiiliated air actually enters into the composition of the fixed air, in this experiment, is evident from the weight of the latter, which far exceeds that of the charcoal dispersed in the process. For, in this last experiment, the weight of the fixed air produced was 4.95 grains. Consequendy, supposing the charcoal to be wholly phlogiston, it is very nearly 60 fixed air may be said to consist of 5.45 parts of dephlogiiliated air.
Fixed Air.

\[ \text{phlogisticated air, and } 1.5 \text{ of phlogiston; so that the dephlogisticated air is more than three times the proportion of phlogiston in it.} \]

Phlogisticated air, he observed that fixed air, he found that the quality of the residuum was evidently better than that of the original fixed air.

In order to discover whether the heat or light of the electric spark were the circumstances which effected the change, the Doctor threw a strong light, by means of a lens, for some hours, on a quantity of pounded glafs confined in some fixed air; but though the volume of residuum was thus somewhat increased, yet as it was of the same quality with common air he suspected that it might be only that portion which had been introduced among the particles of the glafs. The quantity of air was increased after the operation.

With glafs-hone sand made very hot, the quantity of air was likewise increased; but the experiment was not more satisfactory than the former. Heated burnt crucibles increased the quantity of residuum in the proportion of 10 to 6.6; but the quality was injured either directly by a comparison with nitrous air or by producing a larger quantity of residuum equally bad. By heating iron, however, in fixed air, part of it was evidently converted into phlogisticated air. On heating turnings of malleable iron for some time in fixed air, one-tenth part of it was rendered immissible with water; and on repeating the process with the remainder, there was a residuum of one-fourth of the whole.

There was also a small addition to the quantity of air after the first part of the process, but none after the second; nor could he, after a third and fourth process, render more than one-fourth immisible with water. In two experiments, the residuum was inflammable, and burned with a blue flame.

With regard to the quantity of fixed air which may be expelled from different substances, Dr Priestley observes, that from seven ounces of whiting, the purest calcareous substance we are acquainted with, he expelled by heat 630 ounce-measures of air; by which means the whiting was reduced to four ounces. One fourth of this was phlogisticated; the standard being 1.36 and 1.28. Repeating the experiment, he obtained 440 ounce-measures of air from six ounces of whiting; about one-half of which was fixed air, and the remainder of the standard of 1.4. On moistening some calcined whiting with water impregnated with vitriolic acid, he obtained 90 ounce-measures; of which the first portions were three-fourths fixed air, and the standard of the residuum 1.5; the latter had less fixed air and the standard of the residuum was 1.44. The whiting was rendered black and hard, but became soft and white with spirit of salt. Three ounces and a quarter of lime fallen in the air, yielded 275 ounce-measures; of which about one-fifth was fixed air, and the residuum of the standard 1.4. Four ounces of white lead had yielded 240 ounce-measures of air when the retort melted. The residuum of the first process was one-third, the standard 1.36; and of the last the standard was 1.28, that with the common atmosphere being 1.22. Two ounces and three quarters of wood-ashes yielded, in a very strong heat, 450 ounce-measures of air; of the first portion of which one-tenth, of the second one-third, and of the third one-half, was fixed air.

Phlogisticated air is more than three times the proportion of phlogiston in it. I must not conclude, however, without observing, that in one experiment, I never failed to produce fixed air; though it is not easy to form a view of its supposed elements, viz. dephlogisticated air, could enter into it. This is by heating iron in vitriolic acid air. In one of these experiments, four ounce-measures of the vitriolic acid were reduced to 0.65 of an ounce-measure; and of the quantity lost three and an half meares were fixed air absorbed by lime-water; and the remainder was inflammable."

Fixed air, even when pure and unmixed, is remarkably altered by the electric spark, part of it being thus rendered immiscible in water. Dr Priestley, having taken the electric spark for about two hours in a small quantity of fixed air confined by mercury, found, that after the operation, one-fourth of it remained immiscible with water; though, before it, only one-thirtieth part had remained unabsorbed. The inside of the tube had become very black; which, in other experiments of a similar kind with vitriolic acid air, he had observed to arise from the adhesion of a small quantity of mercury super saturated with phlogiston. In another experiment, in which the spark was taken an hour and ten minutes in about half an ounce-measure of fixed air; one-fifth remained unabsorbed, and the standard of the residuum was 0.9; though, before the operation, only one-thirtieth part had been absorbed, and the standard of the residuum was 1.0. In this experiment, also, he observed, that the air was increased about a twentieth part. On taking the electric spark an hour in half an ounce-measure of fixed air, as much residuum was left as had remained in five times the quantity of the same fixed air in which no spark had been taken. This residuum was also much purer than that of the original fixed air, the standard being 0.8; whereas that of the original fixed air had been, as before, 1.0. On repeating the experiment, he found the residuum still greater, but equally pure; and, in this case, a good quantity of black matter was observed adhering to the tube. Having taken the spark in a small tube containing 1/8 of an ounce-measure of fixed air, the inside of the tube was clotted with black matter, and in the bottom was a small quantity of yellowish matter resembling sulphur; the residuum was between one-fourth and one-fifth of the whole, and less pure than formerly. This circumstance he also supposes to be a proof that fixed air may be composed of phlogiston and dephlogisticated air. Pursuing this experiment, by taking the electric spark three hours in a small quantity of fixed air, he observed that it was first increased, and then diminished about one-eighth of the whole; the inside of the tube being very black on the upper part, and below the mercury very yellow, for the space of a quarter of an inch all round the tube; but this space had been above the mercury in the beginning of the operation. One-third of the air remained unabsorbed by water; but so impure, that the standard of it was 1.8, or almost completely phlogisticated. Varying the process by using water impregnated with fixed air instead of mercury, the quantity of air was much augmented by that which came from the water; but thus the far greater part of it was incapable of being absorbed by lime-water; and on this occasion he observed, that water impregnated with fixed air is a much worse conductor of electricity than the same fluid impregnated with mineral acids. On still varying the circumstances of the experiment, by using common water instead of that which had absorbed fixed air, he found that the quality of the residuum was evidently better than that of the original fixed air.

Phlogisticated air is more than three times the proportion of phlogiston in it. I must not conclude, however, without observing, that in one experiment, I never failed to produce fixed air; though it is not easy to form a view of its supposed elements, viz. dephlogisticated air, could enter into it. This is by heating iron in vitriolic acid air. In one of these experiments, four ounce-measures of the vitriolic acid were reduced to 0.65 of an ounce-measure; and of the quantity lost three and an half meares were fixed air absorbed by lime-water; and the remainder was inflammable."
SECT. VI.

AEROLOGY.

Fixed Air. The standard of the residuum of the first portion was 1.6, and of the second 1.7. It extinguished a candle; so that the air came properly from the ashes, and not from any remaining particles of the charcoal mixed with them. After the process, the ashes weighed 839 grains; but by exposure to the air for one day, the weight was increased to 843 grains; and, perhaps, with more heat than before, yielded 50 ounce-measures of air; of which about one-eighth was fixed air, and the standard of the residuum 1.38 and 1.41. A candle burned in this residuum, and the ashes were reduced to 739 grains. Two ounce-measures of Homburg's pyrophorus burned in the open air, and then distilled in a retort, yielded 144 ounce-measures of air; of which one-half at first was fixed air, and the standard of the residuum 1.8. The pyrophorus was then kept two days in the retort, with the mouth immersed in mercury; after which, on being taken out, it burned as strongly as ever. Immediately before the burning, it weighed 428 grains; immediately after it, 449; but it had spread thin and exposed to the atmosphere for a night, the weight was increased to 828 grains; though, on being well dried, it was again reduced to 486. Subjecting it to a greater heat than before, the matter yielded 110 ounce-measures of air; the first portions of which were half fixed air, but the last contained very little, and burned with a blue lambent flame. It was then reduced to 296 grains. The experiment was then repeated with a quantity of pyrophorus, which would not take fire in the open air; and on heating this substance in an earthen retort, five-sevenths of the first part of the produce was fixed air: but this proportion gradually diminished; till at last nine-tenths of the whole was inflammable air, burning with a lambent blue flame. This inflammable air being decomposed with an equal quantity of dephlogisticated air, yielded 0.86 of a measure of fixed air. Another quantity of pyrophorus, which burned very well, and which by exposure to the atmosphere had gained 132 grains, being again exposed to heat in an earthen retort, gave 180 ounce-measures of air; three-sevenths of the first portion of which was fixed, and the rest phlogisticated air; but afterwards only one-half was fixed and the rest inflammable, burning with a lambent blue flame; and at last it was wholly inflammable. This pyrophorus took fire again after being poured out of the retort, but not without the assistance of external heat. It had been red-hot through the whole mass at the first burning, and the surface was covered with white ashes; but all the inside was as black as ever it had been. Four ounces of dry ox-blood yielded 1200 ounce-measures of air, and it was conjectured that not less than 200 measures had escaped. It contained no fixed air. The first portion burned with a large lambent white flame, the middle portion fainter, and the last was hardly inflammable at all. The remaining coal weighed 255 grains, and was a good conductor of electricity.

SECT. VI. INFLAMMABLE AIR.

We owe the knowledge of the existence, and of some remarkable properties of this air, to Mr Cavendish, by whom they were first published in 1767. Its effects, inflammable air, however, had long before been lamentably experienced by miners; in whose subterraneous habitations it is often collected in such quantities as to produce the most frightful effects. It is produced in abundance from the air putrid animal and vegetable substances; and, in general, by all those which part with phlogisticated air. Being much lighter than common air, it always rises to the top of those places where it is generated; so that it cannot be confined except in some vaulted place, but always strives to ascend and mix with the atmosphere. By itself it is very noxious, and will instantly put an end to animal life; but when mixed with atmospheric air, may be breathed in much greater quantity than fixed air. Its great inflammability in this state, however, renders it very dangerous to bring any lights, or even to strike a flint with it, in those places where it abounds. But this only takes place when the inflammable air is mixed with common phlogisticated air; in which case, the explosion is much more violent than the former; for pure inflammable air extinguishes flame as effectually as fixed or phlogisticated air.

Besides the subterraneous places already mentioned, this kind of air is found in ditches; over the surface of putrid waters, out of which it escapes; in burying-places; in houses of office where putrid animal and vegetable matters are accumulated; and may, by flogging or boiling, be extracted from the waters of most lakes and rivers, especially those in which great quantities of fermenting and putrefying matters are thrown; and as putrefaction thus seems to be the principal source of inflammable air, it thence happens, that much more of it is produced in warm than in cold climates. In Great Britain, in those countries, we are informed by Dr Franklin, that if the mud at the bottom of a pond be well strained, and a lighted candle brought near to the surface of the water immediately after, a flame will instantly spread a considerable way over the water, from the accession of the inflammable air, affording a very curious spectacle in the night-time. In colder climates, the generation of inflammable air is not so plentiful as to produce this phenomenon; nevertheless Mr Cavendish informs us, that it may be plentifully procured in the following manner: in all the ponds about London. "Fill a wide-mouthed bottle with the water of the pond, and keep it inverted therein; then, with a flick, stir the mud at the bottom of the pond, just under the inverted bottle, so as to let the bubbles of air which come out of it enter into the bottle; which air is inflammable. When by thus stirring the mud in various places, and catching the air in the bottle until this is filled, a cork or glass stopper must be put over it while standing in water, and then the bottle may be taken home, in order to examine the contained inflammable fluid at leisure." The great quantity of inflammable air produced in warm climates has given occasion to some philosophers to suppose, that it may possibly have formed the air produced in producing certain atmospheric meteors. The weak lightnings without any explosion, which are sometimes perceived near the horizon in serene weather, are by them conjectured to proceed from inflammable air fired by electric explosions in the atmosphere. Mr Volta supposes that the ignes fulgur are occasioned by the inflammable air which proceeds from marshy grounds.
Inflammable Air.

This kind of air is more common than any of the other noxious airs; for there is hardly any inflammable substance on earth, out of which it may not be extracted by one means or other. The fluids, however, which go by the general name of inflammable air, have scarce any other property in common to them all, besides those of inflammability, and being specifically lighter than the common atmospheric air. In other respects, the differences between them are very considerable. The smell, weight, power of burning, of preserving their properties, and the phenomena attending their combustion, are by no means the same in them all; some burning in an explosive manner; others quietly, and with a lambent flame of a white or blue colour. It is, however, necessary to make a proper distinction between an inflammable elastic fluid or inflammable gas, which may be properly called so, and that which is evidently made by combining an inflammable substance with common air; which being easily separable from the air, leaves that fluid in the state it was before. Thus a drop of ether, put into a quantity of common air, mixes itself with it, and takes fire on the approach of flame, like a mixture of inflammable and common air; but if the air to which ether is added be walled in water, the latter is soon separated from it. Common air becomes also inflammable by being transmitted through several essential oils; and thus, the air contiguous to the plant called 

Extracted from various substances by heat.

More air procured by a sudden than gradual heat.

The inflammable air produced in this way came only from the metal, without attending to the share which water had in the production. Some late experiments of Mr Lavoisier, however, showed, that water had a great share in the production of inflammable air; and it is much that it gave occasion to a supposition, that the water was the only source from whence it was derived. This mistake, however, was detected by Dr Priestley, who, by his numerous and accurate experiments, seems to have exhausted the subject. The method which Mr Lavoisier had followed, was to send the steam of boiling water through a red-hot iron tube; in doing which, the intense heat acquired by the water occasioned the production of a great quantity of inflammable air. Dr Priestley repeated his experiments not only with water, but with other fluids. Sending the vapour of two ounces of spirit of wine through a red-hot earthen tube, he obtained 900 ounce-measures of inflammable air, which burned with a white lambent flame. It contained no fixed air; and 50 ounce-measures of it weighed eight grains less than an equal quantity of common air. He collected also 0.35 of an ounce-measure of water. In this experiment, the weight of the water collected was 168 grains, of the inflammable air 633 grains, and that of the spirit of wine originally was 821 grains, so that as little was lost in the process as could be expected. Repeating the experiment with vitriolic ether, an ounce of it treated in the same manner in an earthen tube almost filled with pieces of broken earthen retorts and crucibles, one-tenth part of an ounce of water was collected, and 740 ounce-measures of inflammable air were procured, without any mixture of fixed air, burning with a white lambent flame like that of wood, and not exploding with dephlogisticated air. Twenty-nine ounce-measures of this weighed five grains less than an equal quantity of common air. Vapour of spirit of turpentine yielded inflammable air mixed with much black smoke, which soon collected on the surface of the water in the receiver. The smell of this air was exceedingly offensive, and its flame was much less luminous than that of the former. Its specific gravity was the same with that of the air procured from spirit of wine. Olive oil yielded a considerable quantity of air on being mixed with calcined whiting; the first portions burning with a large white flame, and the last with a lambent blue one.

In extracting air from solid substances, the steam of water was always necessary; and thus inflammable air was produced from a great number of different ones. From sulphur treated in this manner in an earthen tube, inflammable air was obtained of a nature similar to that from oil of vitriol and iron. From arsenic, the produce was one-fourth of fixed air; but all the red strongly inflammable, with a smell faintly distinguishable from that of phosphorus. Twenty ounce-measures of this air weighed 47 grains less than an equal quantity of common air. Both these experiments, however, were very troublesome, on account of the volatility of the matters, which suffused and choked up the tubes. From two ounces of the scales of iron or fining cinder, which he has found to be the same thing, Dr Priestley obtained 580 ounce-measures of air; one-tenth of the first part of which was fixed air, but afterwards it was all inflammable. Forty
AEROLOGY.

Air produced in this manner (says he) is of the lightest kind, and free from that very offensive smell which is generally occasioned by the rapid solution of metals in oil of vitriol; and it is extricated in as little time in this way as it is possible to do it by any mode of solution. The following experiment was made with a view to ascertain the quantity of inflammable air that may be procured in this manner from any given quantity of iron. A little hundred and sixty grains of iron, when distilled in acids, will yield about 800 ounce-measures of air; but, treated in this manner, it yielded 1044 measures, and then the iron had gained 329 grains in weight (A).

Inflammable air having been at first produced only from metals by means of acids, it was then supposed that part of the acid necessarily enters into its composition; but this hypothesis is now found to be ill grounded. That no acid (says Dr Priestley) is necessarily contained, or at least in any sensible quantity, is shown by the following experiments. No acid being contained in the two kinds of air, without perceiving the least variation than those with iron, however, were the bones to blacken, the weight of water expended, as it is possible to do it by any mode of solution in inflammable air, though produced by means of acids, or in the dephlogisticated air of the atmosphere, is evident from the following experiment, which I made with the greatest care: Taking a basin which contained a small quantity of water tinged blue with the juice of turnip, I placed it in a bent tube of glass, which came from a vessel containing iron and diluted oil of vitriol; and lighting the current of inflammable air as it issued from this tube, so that it burned exactly like a candle, I placed over it an inverted glass jar, so that the mouth of it was plunged in the liquor. Under this jar the inflammable air burned as long as it could; and when extinguished for want of more pure air, I suffered the liquor to rise as high as it could within the jar, that it might imbibe whatever should be deposited from the decomposition of either of the two kinds of air. I then took off the jar, changed the air in it, and lighting the flame of inflammable air, replaced the jar as before. This I did till I had decomposed a very great quantity of the two kinds of air, without perceiving the least change in the colour of the liquor, which must have been the case if any acid had entered as a necessary constituent part into either of the two kinds of air. I also found no acid whatever in the water, which was procured by keeping a stream of inflammable air constantly burning in a large glass balloon, through which the air could circulate, so that the flame did not go out. Neither was there any acid produced in the decomposition of inflammable and dephlogisticated air in a strong close glass vessel.

With respect to inflammable air, I have observed, that when sufficient care is taken to free it from any acid vapour that may be accidentally contained in it, it is not in the smallest degree affected by a mixture of alkaline air. On the whole, therefore, I have at present no doubt, but that pure inflammable air, though it certainly contains water, does not necessarily contain any

(A) In these experiments, the Doctor seems not to have supposed that any particular kind of water was necessary for this production of inflammable air; but in the Memoirs of the Philosophical Society at Haerlem, it is ascertained by Dr. Deiman and M. Paets Van Troostwyk, that the experiment will not succeed when boiled or distilled water, or any other than that containing fixed air, is made use of; and to this air they attribute the calcination of the iron, and production of inflammable air. This assertion, however, is contrary to what we find related by Mr Kirwan. See n. 138.
AEROLOGY.

Sect. VI.

Inflammable Air.

Early experiments convinced me that inflammable air is capable of a variety of impregnations as inflammable air is.

Mr Cavendish first perceived the necessity of moisture to the production of inflammable air; but it was not until after making several experiments that Dr Priestley could adopt the same idea. He had observed some very remarkable circumstances relating to the production of inflammable air from charcoal, by which he was induced to suppose that the former was pure phlogiston in a volatile state without any moisture whatever.

The Doctor observes, that "charcoal is generally said to be indestructible, except by a red heat in contact with air. But I find (says he), that it is perfectly destructible, or decomposed, in vacuo, and, by the heat of a burning lens, almost convertible into inflammable air, so that nothing remains besides an exceedingly small quantity of white ashes, which are seldom visible, except when in very small particles they happen to cross the fun-beams as they fly about the receiver. It would be impossible to collect or weigh them; but according to appearance, the ashes thus produced, from many pounds of wood, could not be supposed to weigh a grain. The great weight of ashes produced by burning wood in open air arises from what is attracted by them from the air. The air which I get in this manner is wholly inflammable, without the least particle of fixed air in it. But in order to this, the charcoal must be perfectly well made, or with such a heat as would expel all the fixed air which the wood contains; and it must be continued till it yields inflammable air only, which in an earthen retort, is soon produced.

"Wood or charcoal is even perfectly destructible, that is, resolvable into inflammable air, in a good earthen retort, and a fire that would melt iron. In these circumstances, after all the fixed air had come over, I several times continued the process during a whole day; in all which time inflammable air has been produced equally, and without any appearance of a termination. Nor did I wonder at this, after seeing it wholly vanish into inflammable air in vacuo. A quantity of charcoal made from oak, and weighing about an ounce, generally gave me about five ounce-measures of inflammable air in twelve minutes."

Although from these experiments it did not appear that water was in any ways essentially necessary to the production of this kind of inflammable air, it appeared manifestly to be so in the following: "At the time (says he) when I dispersed any quantity of charcoal with a burning lens in vacuo, and thereby filled my receiver with nothing but inflammable air, I had no suspicion that the wet leather on which my receiver stood could have any influence in the cafe, while the piece of charcoal was subject to the intense heat of the lens, and placed several inches above the leather. I had also procured inflammable air from charcoal in a glazed earthen retort for two whole days successively, during which it continued to yield it without intermission. Also iron-filings in a gun-barrel, and a gun-barrel itself, had always given inflammable air whenever I tried the experiment. These circumstances, however, decided me, and perhaps would have decided any other person; for I did not know, and could not have believed, the powerful attraction between water and charcoal or iron, when the latter are intensely hot. They repel, and attract it, in the midst of compounds, even charcoal or iron and water.

Inflammable air is not pure phlogiston. I then repeated the experiment with the charcoal, making the receiver, the stand on which I placed the charcoal, and the charcoal itself, as dry and hot as possible, and using cement instead of wet leather, in order to exclude the air. In these circumstances I was not able, with the advantage of a good fun and an excellent burning lens, to decompose so much as two grains of the piece of charcoal which gave me ten ounce-measures of inflammable air; and this, I imagine, was effected by means of so much moisture which was deposited from the air in its state of rarfaction, and before it could be drawn from the receiver. To the production of this kind of inflammable air, therefore, I was now convinced that water is as essential as to that from iron."

In his analysis of different kinds of inflammable air, Priestley's analysis of different kinds of inflammable air shows that the Doctor observes, that the difference most commonly perceived is, that some of them burn with a lambent flame, sometimes white, sometimes yellow, and sometimes blue; while another kind always burns with an explosion, making more or less of a report when a lighted candle is dipped into a jar filled with it. The inflammable air extracted from metals by means of acids is of this last kind; and that from wood, coal, or other inflammable substances by means of heat, belongs to the former. It has also been observed, that the kinds of inflammable air have different specific gravities; the purest, or that which is extracted from iron, &c., being about ten times as light as common air; but some of the other kinds not more than twice as light (A).

This difference was for some time attributed to a quantity

(A) Here the Doctor's calculation differs somewhat from that of Mr Kirwan; who, in his Treatise on Phlogiston,
quantity of fixed air intimately combined with the heavier kinds, so that it could not be discovered by lime-water, while the lightest contained no fixed air at all. In order to ascertain this point, he had recourse to decomposition; which was performed by mixing with the inflammable air to be tried an equal quantity of common or dephlogisticated air, and then confining them in a strong glass vessel previously filled either with water or mercury; making afterwards an electric spark in some part of the mixture by means of wires inserted through the sides of the vessel, and nearly meeting within it. Thus he supposed that he might be able to determine the quantity of combined fixed air, and likewise the relative quantity of phlogiston contained in each of them. The former appeared by washing the air with lime-water after the explosion, and observing how much of them was absorbed; and the latter by examining the residuum with the test of nitrous air, and observing the purity of it. Finding, however, that, in some cases, more fixed air was found after the explosion than could have been contained in the inflammable air, he was led to observe the generation of fixed air from the principles mentioned in the last section.

In prosecuting this subject, it was found, that one measure of inflammable air produced by steam from metals, and one of dephlogisticated air, such as by mixture with two measures of nitrous air was reduced to 0.72 of a measure, were reduced by explosion to 0.6 of a measure; the residuum, by an equal quantity of nitrous air, was reduced to 0.87. With the same dephlogisticated air, the inflammable air from fining-cinder and charcoal was reduced only to 1.85 of a measure; but by washing in lime-water, to 1.2. The residuum examined by nitrous air appeared to be of the standard of 0.9. In another process, the diminution after the explosion was to 1.55, and that after washing in lime-water to 0.65, of a measure; in a third, by explosion to 1.6, and by washing to 0.66; and in a fourth, the first diminution was to 1.6, and the second to 0.9. In this last experiment there was a generation of an entire measure of fixed air; and that this had not been contained originally in any latent state in the original fluid, was evident from the specific gravity of the inflammable air made use of. This, indeed, was one of the heaviest kinds of the fluid: but 40 ounce-measures of it weighed only two grains more than an equal bulk of common air; whereas, had all the fixed air found in the residuum been contained in the original air, it must have been at least one half heavier. "Indeed (says the Doctor) if any quantity of inflammable air, of about the same specific gravity with common air (which is the case with that species of it I am now considering), yield so much as seven-tenths of its bulk of fixed air in consequence of its explosion with dephlogisticated air, it is a proof that at least part of that fixed air was generated in the process, because seven-tenths of such fixed air would weigh more than the whole measure of inflammable air."
Inflammable Air.

Proportions already mentioned, the diminution was the same as with inflammable air produced from the malleable kind, viz. 1:36.

In the experiments it seemed evident, that at least part of the fixed air found after the explosion was produced by its means; but the following seem no less convincing proofs, that fixed air may be converted into the inflammable kind, or at least that the elements of fixed air may remain in inflammable air in such a manner as to be imperceptible. On heating in an earthen retort a quantity of flaked lime, which had long been kept close corked in a bottle, it gave air, of which one-fifth was generally fixed air; but in the gun-barrel the same lime yielded no fixed air at all, but a great quantity of inflammable air of the explosive kind, like that which is got from iron alone by means of water. As this total disappearance of the fixed air appeared extraordinary, the Doctor was induced to repeat it several times with all possible care; and the following was the result of his experiments: Three ounces of flaked lime, which had for some time been exposed to the open air, heated in an earthen tube, yielded 14 ounce-measures of air, of which only two and an half remained unab sorbed by water; the residuum was slightly inflammable, but not perfectly phlogisticated. Three ounces of the same lime, heated in a gun-barrel, gave 20 ounce-measures of air, all of which was inflammable, and no part fixed. It was expected, however, that the fixed air would have appeared in the decomposition of this inflammable air with the phlogisticated kind; but after this process, it appeared to be exactly such inflammable air as is procured from metals by the mineral acids, or by steam; the diminution of the two kinds of air being exactly the same: and thus some fixed air was found in the residuum, it was no more than is usually met with in the decomposition of inflammable air procured by means of spirit of salt.

Supposing that the two kinds of air might incorporate, when one of them was generated within the other, a gun-barrel was filled with fixed air, and the closed end of it put into a hot fire. Inflammable air was instantly produced; but when the fixed air was separated from it, it burned like inflammable air with which no other kind had ever been mixed.

On heating iron-turnings in five ounce-measures of fixed air, the quantity of it was increased about one ounce-measure, and there remained one and three-fourths unab sorbed by water. The experiment was repeated with the same result; and it was further observed, that though the inflammable air procured in this manner did not appear by the test of lime-water to contain any fixed air, yet when it was decomposed by heating it with an equal quantity of phlogisticated air, the residuum contained one-third of fixed air. The diminution was to 1:45. Hence the Doctor conjectures, that in some cases, the fixed air appears to be generated by the decomposition of phlogisticated and inflammable air, yet that inflammable air, when thus produced in contact with fixed air, may combine with it, so as to be properly contained in it, and in such a manner that it cannot be discovered by lime water.

Inflammable air, when produced in the driest way possible, is exceedingly light, as has been already observed: but Dr Priestley has found, that by standing on water, a very considerable increase is made in its specific gravity; so that from being ten or twelve times lighter than atmospheric air, it becomes only four or five times lighter. This great propensity of inflammable air with water is also taken notice of by Mr Kirwan; who tells us, that the bulk of inflammable air obtained over water with the assistance of heat towards the end, was one-eight greater than when produced over mercury, but that the weight of it in the former case was only eight or nine times less than common air.

"From 85 cubic inches of inflammable air obtained over water, I extracted," says he, "by oil of vitriol exposed to it for 35 hours, two grains of water; and, though undoubtedly there is an error in all these experiments, yet there can be little doubt but this inflammable air contained one-half its weight of water. The inflammable air, by the subfraction of its water, lost its smell, but continued as inflammable as ever; and therefore there is no reason to think that it was decomposed, or that water is any way essential to it."

The conclusion is directly contrary to that of Dr Priestley, that water is an essential ingredient in the composition of inflammable air; nor do the experiments of the latter, already recited, seem to have had any weight with him, as he concludes his Treatise on Phlogiston in these words. "To the proofs I have heretofore given, that inflammable air and phlogiston are the same substance, just as ice and the vapour of water, or the same essence, no objection of any weight has since been made. Some have thought, that I should have included the matter of heat or elementary fire in the definition of inflammable air; but fire is contained in all corporeal substances, it is perfectly needless, except where bodies differ in the quantity of it they contain; and in this respect I expressly mentioned its difference with phlogiston to confit."

Others, attending to the quantity of water contained in inflammable air, have supposed it to be an essential ingredient in the composition of this air, and have called it phlogisticated water; but they may as well suppose silver water to be an essential ingredient in common air, or fixed air, and call this last acidulated water; for inflammable air, equally as other airs, may be deprived of its water without any limitation, and yet preserve all its properties unaltered, which shows the presence of water to be no way essential to it. Lastly, others have thought, that it essentially requires an acid or an alkali, or some saline substance, for its basis; as if there were any more repugnance in the nature of things that phlogiston should exist in an aerial state without any basis, than marine air, alkaline air, or phlogisticated air; when it is evident, than an aerial state requires no more than a certain proportion of latent heat; but the production of inflammable air from iron by means of distilled water, without any acid or salt, has effectually done away any suspicion of that sort.

On the other hand, Dr Priestley informs us, that inflammable air seems now to consist of water and in keys constituting inflammable air; which, however, seems extraordinary, as the two substanccs are hereby made to involve each other; one of the constituent parts of water being inflammable air, and one of the constituent parts of inflammable air being water; and therefore, if the experiments would favour it (but I do not see that they do so.)
log. 177

Sect. VI. Aerology.

Inflammable Air.

Inflammable Air, like fixed air, consists of phlogiston and dephlogisticated air, in some different mode of combination.

"There is an astonishing variety in the different kinds of inflammable air, the cause of which is very imperfectly known. The lighted, and therefore probably the purest kind, seems to consist of phlogiston and water only. But it is probable that air, and that of different kinds, may be held in solution in several of them, and be the reason of their burning with a lambent flame, and also of their being so readily resolved into fixed air when they are decomposed by dephlogisticated air; though why this should be, I cannot imagine.

"When inflammable and dephlogisticated air are burned together, the weight of the water produced is never, I believe, found quite equal to that of both kinds of air. May not the light, therefore, emitted, from the flame, be part of the phlogiston of the inflammable air united to the principle of heat? And as light accompanies the electric spark, may not this also be the real evidence of some phlogistic matter, though it is not easy to find the source of it."

The French chemists, who deny the existence of phlogiston, are of opinion, that inflammable air is a simple uncombined element; but for a more full discussion of this subject, see the article PHLOGISTON.

Inflammable air is absorbed by water in considerable quantity, but by the application of heat may be expelled against equal quantity. By agitation in water Dr Priestley was formerly of opinion that this kind of air might be rendered as good as common air; but this undoubtedly proceeds from the atmospheric air transmitted by the water, as the air with phlogisticated air mentioned in the last section. After a quantity of water, which had absorbed as much inflammable air as it could, had been suffered to stand a month, it was expelled by heat, and found to be as strongly inflammable as ever. The water after the process, deposited a kind of fliny matter; which he supposed to be the earth of the metal that had been employed in producing it.

Plants in general grow tolerably well in inflammable air, and the willow plant has been observed to absorb great quantities of it. Its inflammability is not diminished by the putrefaction of animal substances, nor do their putrefaction seem to be retarded by it. Animals confined in it are killed almost as soon as in fixed air; but insects, which can live a considerable time in phlogisticated air, live also a considerable time in this kind of air; but at last they become torpid, and appear to be dead, though they will still recover if removed into the open air. Mr Cavallo relates, that the Abbe Fontana, having filled a large bladder with inflammable air, began to breathe it in his presence; after having made a very violent expiration, in which cafe the effects are most powerful. The first inspiration produced a great opprobrium in his lungs, the second made him look very pale, the third was scarce accomplished when he fell on his knees through weakness. Birds and small quadrupeds, inclosed in small vellums of this air, died after very few inspirations. Lastly, inflammable air appears to have a smaller power of refractive power than common air; for Mr Wattlire informs us, that having placed an hollow triangular prism, of which the angle was 72 degrees, so as to half cover a large object inflammable glases in one of Mr Dollond's spectacles, and so turned round as to make the frame of a window, the distance of 1280 feet, fixed partly through the prism and partly through common air, appear undivided. The inflammable air was then blown out of the prism, but no part of the apparatus was moved; when the frame of the window seen through the object glases and the prism as before, seemed to separate about four inches.

The inflammability of this species of air has given occasion to various projects concerning it; such as that of employing it to give light and heat; and lamps have been described, which may be lighted by the electric spark in the night time. By its means also very pretty artificial fires are made, with glases tubes bent in various directions, and pierced with a great number of small apertures. The inflammable gas is introduced into these tubes, from a bladder filled with that fluid, and fitted with a copper cock. When the bladder is prefixed, the inflammable air, being made to pass into the tube, fills up all the small apertures, and is set on fire by a lighted taper. None of these contrivances, however, have ever been applied to any use; and the scheme of Mr Volta, who proposed to substitute its explosive force instead of gun-powder, is found insufficient, on account of the weakness of the explosion, except when the two airs are fixed in very great quantity, which would be incompatible with the small bulk necessary for warlike engines.

Sect. VII. Sulphurated Inflammable Air.

This was discovered by Dr Priestley at the time when he was engaged in the experiment of which some account has been given in the last section, of transmitting the steam of water and other fluids through red-hot mortars containing some solid material. Having, at first produced other kinds, treated manganese in this manner, by burning them, it was received forty ounces of this air, one-seventh of which was fixed, and the rest of the standard of 1.7, lambently inflammable. Having then opened the other end of the tube in order to admit the steam, air was procured more copiously than before. Of 50 ounces of this air, one-seventh was fixed, and the rest of the standard of 1.8, explosively inflammable. The last portions were very turbid; and the smell, especially that of the last portion, was very sulphureous, tingeing the water of a very dark colour, by depositing in it a quantity of black glassy matter. However, the air itself became perfectly transparent, and had no other appearance than that of any other kind of air. On looking at the jar in about ten minutes after, it was quite black and opaque; so that nothing could be seen on the inside of it. Filling afterwards another jar with the same kind of air, in order to observe the progress of this uncommon phenomenon, he found, that when the water was well fufphed, black specks began to appear in different places, and, extending themselves in all directions, at length joined each other, till the whole jar became perfectly black, and the glass opaque. When this was done, he transferred the air into another jar; and it soon produced a similar effect upon this, though it never became...
This kind of air, when pure, is instantly fatal to animal life, and extinguishes flame; though, when mixed with common atmospheric air, it is slightly inflammable, and also medicinal in fumings and other cafes of debility. A candle dipped into a jar of this air is extinguished; but just before the flame goes out, it is enlarged by the addition of another flame of a pale yellow colour, and sometimes a weak flame spreads for a considerable way, or even through the whole body of the alkaline air. The electric spark, taken in it appears of a red colour. Every spark taken in it augments its bulk, and by degrees turns the whole into inflammable air. It is readily absorbed by water, as has been already observed, and dissolves ice almost as fast as an hot fire. On confining some water impregnated with alkaline air in a glass tube, and thus expelling it to a strong heat in a sand-furnace for some days, he observed that a white sediment or ashes formed on the surface. The Dr remarked, that his being the same thing, he had got before. On burning a quantity of it, this kind of air appeared to contain some vitriolic acid, the balloon being filled with a very dense white fume, which rendered the water febibly acid to the taste. On decomposing it with dephlogisticated air, however, he found the diminution exact; the same as when common inflammable and dephlogisticated air were used; and that it appeared to contain neither more nor less phlogiston than the other; only there was a small quantity of fixed air produced, which is never the case with common inflammable air from vitriolic acid and iron.

When the sulphurated inflammable air is received over mercury, very little black matter is produced on the glass; the colour presently disappeared, and a yellow matter collected on them, when the air is taken through water, soon grows yellow upon exposing it to the air, it is not the cafe with that, which remains in the water; it adheres to the evaporating vessel in form of a black incrustation, which does not burn blue until it has been digested in the nitrous acid, which deprives it of its pungent phlogiston, and leaves it both of the colour and smell of sulphur.

**SECT. VIII. OF ALKALINE AIR.**

This was procured by Dr Priestley, in the begin-ning of his experiments, from common spirit of sal-ammoniac with quicklime, or the materials from which it is made. He did not at that time procure the discovery farther than by impregnating water with it, which means he could make a much stronger alkaline spirit than any to be met with in the shops. His method of procuring it was by mixing one part of pounded sal-ammoniac with three parts of flaked lime, and for common experiments the same quantity of materials would last a considerable time.
In examining the phenomena which attend the conversion of alkaline air into inflammable air, the Doctor was induced to believe that it was occasioned by heat alone, without the concurrence of light. The effects of the former were first perceived on heating one ochre of iron in alkaline air; when, though the matter turned black, as in an incipient reduction of the metal, he found a considerable increase of quantity instead of decrease in the air, as he had expected; and, on examining the quality of it, he found that it contained no fixed air, but was entirely inflammable. With scales of iron a similar enlargement was perceived; but in this way he could never increase the quantity to more than double that which had been originally employed, and even after this the whole emitted strongly of volatile alkali; and the iron had undergone no change.

The Doctor, now, concluding from these experiments that the change of alkaline into inflammable air was produced by this cause alone, proceeded to repeat the experiment, by heating in the alkaline air bits of dry crucibles, or of earthen retorts, which had been just before exposed to very great heats, so that they could not be supposed to give out any air themselves, and therefore could only serve to communicate a strong heat to the alkaline air; and in these experiments the result was the same as when ochre or iron were made use of. The bits of white earthen ware were always turned black; but finding the same effect of augmenting the air and giving it an inflammable quality, though he used the bit of crucible over and over again, he was thoroughly convinced that the change was effected by heat alone.

In all these experiments, however, with a burning-glass, as a strong light was also concerned, he heated a quantity of alkaline air in a glass glas retort, receiving in a glass tube, filled with water, all the air that could be expelled from it by heat. At first it was all absorbed by the water, being merely alkaline air expelled by the rarefaction; but when the bulb of the retort became red-hot, he found that the bubbles driven out were not wholly absorbed, and at last none of them were so. These were altogether inflammable; so that no doubt remained of the change being produced by heat alone, without any intervention of light.

It was farther observed, that whenever the alkaline air was changed into inflammable by means of bits of retorts or crucibles containing clay, they always became black during the process. He inclined therefore to suppose, that something might be deposited from the air which might attach itself to the clay. "Indeed, (says he) if this was not the case, I do not see why the clay should become black; though, perhaps, part of the fame phlogiston which forms the inflammable air may be attracted by the red-hot clay, with-
Nitrous Air.

Properties of nitrous air.

In common experiments no other degree of heat is necessary than that produced by the effervescence itself, except mercury be used, which requires the application of some degree of heat; but when the metal escapes a very great surface to the acid, as is the case when the filings of the metal are used, the effervescence and production of nitrous air are often much quicker than can be conveniently managed. The most proper method of producing nitrous air, however, is explained in the last section of this treatise.

Nitrous air by itself is equally transparent and invisible with common air, excepting at its first production, when it is somewhat coloured, owing to a little superficial nitrous acid, or to some earthy particles which are carried up with it. Its smell resembles that of nitrous acid, or indeed is the very same; because, in passing through the common air to our nostrils, it is decomposed, and converted into nitrous acid. The same is to be said of its taste; though Mr Fontana, who tasted it without any contact of external air, affirmed that it has no taste whatever. The method in which he ascertained this fact was as follows. Having first introduced the nitrous air into a bottle of elastic gum in water, as is done with glass bottles, he brought his mouth, shut, while the neck of the elastic gum bottle was under water, near the neck of it; and then, by pressing the bottle, introduced the nitrous air into his mouth. The experiment, however, is by no means void of danger; for if the person happens to draw any quantity of this air into the lungs, he may be nearly suffocated, as nitrous air is exceedingly noxious. In performing it, he recommends to exhaust the mouth entirely of common air, though he does not inform us how this can be done; nor indeed is it easy to conceive the possibility of doing so.

Though nitrous air extinguishes flame, it may by certain processes be brought into such a state that a candle will burn in it with an enlarged flame; and it becomes what Dr Priestley calls dephlogisticated nitrous air, which is treated of in the next section. It is remarkable, however, that when a candle is extinguished, as it never fails to be in common air, the flame seems to be a little enlarged about its edges by the addition of another bluish flame before the former goes out.

Nitrous air seems to be the most fatal to animal life of any. Even insects, which can bear phlogisticated and inflammable air, generally die the moment they are put into it. Frogs, snails, and other animals which do not respire very frequently, die in a few minutes, and generally do not recover even when taken out of this noxious fluid before they are dead. Plants perish very soon in nitrous air, and even in common air saturated with nitrous air; but Dr Priestley informs us, that "though in general plants die almost immediately in water impregnated with nitrous air, yet in one case of this kind, when the superfusious nitrous air was let out under water, so that no part of it was decomposed in contact with the water, the plant grew in it remarkably well."

Water, by agitation in nitrous air, may be made to imbibe one-tenth part of its bulk; and afterwards the nitrous air may be expelled again by boiling, though not in the same quantity as it was absorbed; but for this purpose the water should be previously deprived of its air. Dr Priestley informs us, that having carefully pumped all the air out of a quantity of rain-water, letting it stand 24 hours in a good vacuum, and then impregnating it with nitrous air, he instantly expelled it again by boiling, when he obtained only about one quarter of it, though sufficiently pure, and without any mixture of fixed air. Water may also be deprived of the nitrous air it contains, though it does not freeze quite so readily when impregnated with this air as in its natural state.

Nitrous air is absorbed by strong oil of vitriol nearly in the same quantity as by water; the acid acquiring a purple colour, by reason of the phlogiston contained in the nitrous air. The strong nitrous acid absorbs it in great quantity; and becomes smoking, orange coloured, and afterwards green, on account of the phlogiston contained in it. Marine acid imbibles but a small quantity, and very slowly, acquiring at the same time a light-blue colour. Both nitrous air and common air phlogisticated by it are mellowed by agitation in nitrous acid.

Nitrous air is absorbed in considerable quantity by radical vinegar, and the concentrated vegetable acid.—Solution of green vitriol imbibes it in much greater quantity than water, and acquires a black colour; which, however, soon goes off by exposure to the common air. Its taste also becomes acid.—Very little is absorbed by caustic alkalis. Oil-olive slowly absorbs a considerable quantity, but oil of turpentine absorbs much more. By a little agitation, it will imbibe more than ten times its quantity of nitrous air; acquiring at the same time a yellowish or orange colour, and becoming a little glutinous. The part which is not absorbed appears to be converted into phlogisticated air.—Ether and spirit of wine absorb it very quickly, but no nitrous air is obtained by the application of heat after they have absorbed it. It is greatly diminished by oil of turpentine, liver of sulphur, and pyrophorous; all of which leave it in a phlogisticated state. It is also diminished and phlogisticated by being kept in a bladder, alternately exposed to moisture and dryness. Nitrous acid air has the same effect.

One of the most remarkable properties of nitrous air is its diminution with phlogisticated air; by phlogisticated air which means it becomes a tenth of the quantity of that kind of air contained in the atmosphere. With pure phlogisticated air, the diminution is almost to nothing, at the same time that some quantity of nitrous acid is reproduced by the decomposition of the nitrous air; but as our atmosphere is always mixed with a considerable quantity of phlogisticated air, on which nitrous
Nitrous air has no effect, the diminution in this case is never so considerable. Upon this principle the Euphrometer is constructed.

Another very remarkable property of nitrous air is its strong antifeptic power; in so much that animal matters may, by its means, be preserved for many months without corruption. This property, it was thought, might have been extremely useful on many occasions; but Dr Prieslely, after a number of experiments on the subject, concludes in the following manner. " Nitrous air will indeed preserve meat from putrefaction; but after long keeping, it becomes very offensive both to the nostrils and palate, though the smell is not altogether that of putrefaction; and indeed the substance containing quite firm, it could not be properly putrid. Having formerly experienced the remarkable antifeptic power of nitrous air, I proposed an attempt to preserve anatomical preparations, &c. by means of it; but Mr Key, who made the trial, found, that, after some months, various animal substances were shrivelled, and did not preserve their forms in this kind of air."

The specific gravity of nitrous air, as well as of other kinds, has been ascertained by Mr Kirwan. As it corrodes metals, he endeavoured to find its weight by comparing the lost weight of the metals involved with the materials which produce it. Thus he found, that 14 grains of the materials produced 38.74 inches of nitrous air; and, consequently, by proper calculation, that the specific gravity of nitrous air is to that of atmospheric air as 1955 to 1000. "If this air (says he) had been obtained over water, or in strong heat, its weight would probably have been very different; as it is liable to be mixed with phlogisticated air, nitrous vapour, and a variable quantity of water. Nitrous vapour would render it heavier, and phlogisticated air or water probably lighter."

With regard to the constituent principles, or elements of nitrous air, all those who look upon phlogiston to be a distinct substance, have believed that the former is a compound of nitrous acid and phlogiston. By the opposite party, it is supposed to be a substance entirely simple, and one of the constituent parts of the nitrous acid. This opinion seems in part now to be entertained by Dr Prieslely himself, notwithstanding his former sentiments on the subject. "I had no doubt on the subject (says he) until I read the work of Mr Metherie, who afferts, that nitrous air contains no proper nitrous acid, but only one of the elements of it; the other being phlogisticated air, which had before been confidered by Mr Lavoisier as the principle of all acidity. Among other observations in support of his affection, Mr Metherie has the following. 1. Nitrous air burnt together with inflammable air, produces no nitrous acid. 2. Though nitrous air be obtained from a solution of mercury in the nitrous acid, almost all the acid is found in the solution. 3. Nitrous air, absorbed by marine air, does not make aqua regia. 4. He is of opinion, that a small portion of the nitrous acid being decomposed, furnishes a pure air, so altered, that, uniting with inflammable air, it changes it into nitrous air."

"In reviewing the experiments I had formerly made on this kind of air, I could not recollect any of them in which the pure nitrous acid was produced, excepting that with phlogisticated air, besides the experiment in which it was decomposed by the electric spark; which furnishes a strong objection to this hypothesis." To ascertain the matter more fully, the following experiments were made.

"When nitrous air is decomposed by iron, or by a mixture of iron and sulphur, the water, over which the process is conducted, acquires no acidity; but I had supposed that all the acid was absorbed by the iron. Having by me a quantity of this iron which had been reduced to perfect rust in nitrous air, and which, I knew, must have imbibed more than its weight of the air, I thought that the acid might be obtained from it by distillation; but a quantity of this rust of iron, distilled in an earthen retort, yielded neither nitrous air nor nitrous acid, at least in any quantity that could favour the common hypothesis."

"I then endeavoured to decompose nitrous air by heating iron in it with a burning lens; and in this process I succeeded far beyond my expectation: for the air was perfectly diminished in quantity, while the iron became of a darker colour, was sometimes melted into balls, and gathered considerable weight, though it had no appearance of containing any nitrous acid."

In the first experiment, the original quantity of nitrous air was diminished to about one-third; and after this, it was increased. "The increase was found to arise from a production of inflammable and phlogisticated nitrous air."

The Doctor proceeded to try various other experiments on the decomposition of nitrous air, particularly that of burning Homberg's pyrophorus; but without any success, or obtaining the smallest particle of nitrous acid. His conclusions from the whole are the following.

"Water seems to be a necessary ingredient in nitrous as well as inflammable air; at least without a quantity of water, nitrous air cannot be formed. For example, copper will be dissolved in strong nitrous acid without producing any nitrous air, just as iron may be dissolved in concentrated vitriolic acid without producing inflammable air."

"That nothing is necessary to the formation of nitrous air besides phlogisticated nitrous acid and water, is evident from the production of it by the impregnation of pure water with phlogisticated nitrous vapour formed by the rapid solution of bismuth; an experiment which I mentioned before. However, to make it in a more unexceptionable manner, I interpolated a glass vessel between that in which the solution was made and that in which the water to be impregnated with the phlogisticated vapour was contained, that whatever was distilled over by the heat of the process might be prevented from reaching the water. In these circumstances, however, when nothing but the dry phlogisticated vapour could enter the water, it began to sparkle and yield nitrous air very copiously as soon as it had received a bluer tinge from the impregnation. Nitrous air is also produced by pouring a highly coloured or phlogisticated nitrous acid into pure water, in which no metal or earthy matter is in any way concerned."

"I have formerly observed, how readily nitrous air is diminished by taking the electric spark in it. This the electric experiment I have frequently repeated, in order more particularly..."
particularly to ascertain the quantity and quality of the residuum. In one experiment half an ounce of nitrous air was reduced, in less than half an hour, to one-quarter of its bulk. One-fourth of the residuum was still nitrous, and the rest phlogificated. Taking the electric spark in a quantity of nitrous air till it was diminished to one-third, the whole was completely phlogificated, not affecting common air at all, and extinguishing a candle. A white matter was formed with the mercury over which the spark was taken, which made the water admitted to it extremely turbid. In another process, the electric spark was taken in a quantity of nitrous air till it could no more be diminished, when it was reduced in bulk in the proportion of 10 to 24. Letting it stand all night upon the mercury, it was increased in the proportion of 11 to 24; seemingly by the acid uniting to the mercury and generating more nitrous air, since it had that smell. No water appeared after the process; and the water admitted to it acquired no acid taste, but an astringent one like that of water impregnated with nitrous air. There was a white powder formed, as in the former experiments. To try if it were possible to make water imbibe the acid from the nitrous air, the electric spark was taken in it, with a small quantity of water over the mercury. But even this water did not acquire any acid taste, but only an astringent one.

The Doctor concludes his experiments on this subject with a conjecture, that the phlogiston, and neither the heat nor light of the electric, contributes to the decomposition of nitrous air. As his final conclusions on the matter, however, are merely conjecture, without any certain experiments to confirm them, we shall here refer the reader to his Section on Theory, at the end of his sixth volume of experiments, &c.

Section X. Phlogificated Nitrous Air.

This species differs from common nitrous air in being able to support flame, though it still continues fatal to animal life. Common nitrous air may be converted into the phlogificated kind by particular processes; though, when zinc is dissolved in the nitrous acid, if the air be taken at different times, that which comes about the middle, or rather the latter end of the process, will be of this kind; in which it not only supports the burning of a candle, but the flame is enlarged (sometimes to four or five times its original bulk) by the addition of a weaker and bluish flame round the former; and this burning is sometimes accompanied with a crackling noise, as if the candle was burning in dephtogificated air. It may also be obtained in some part of the process of procuring nitrous air from iron, though with this metal the success is uncertain; but it yields a considerable quantity of it. By expelling iron to nitrous air, it may be so far dephtogificated as to admit a candle to burn in it. Dr Priestley filled an eight-ounce phial with nails, and then with mercury; and displacing the mercury with nitrous air, left the phial inverted in a quantity of the same fluid. Two months after, the nitrous air was found to be changed in such a manner as to admit a candle to burn in it with its natural flame; and by continuing still longer in contact with the iron, a candle would burn in it with an enlarged flame. These changes, however, are very irregular, so that they seldom produce the like Dephtogificated effects with the regularity one might expect. Dr. Priestley once found, that by the contact of iron in quicksilver, it was so changed as to be fired with an explosion like a weak inflammable air; whilst another quantity of nitrous air, which had been treated in like manner for about the same length of time, only admitted a candle to burn in it with an enlarged flame.

In that section of his last volume in which the Doctor treats of this kind of air, he observes, that water is not parts absolutely necessary to its composition, or rather to the decomposition of the common nitrous air by iron. He had decomposed it before, either by previously filling the vessels that were to contain the nitrous air with water or with mercury; though it had always required a much longer time when the latter was made use of. The reason of its being formed at all in this last way, was a small quantity of moisture adhering to the inside of the vessel containing the mercury.

To try the influence of water in this case, he now Effects of procured a number of very clean small needles; and water on having made a phial, and likewise a proper quantity of mercury, quite clean and dry, he put the needles into the phial, and, filling it up with mercury, introduced the nitrous air: but it continued in this way for six or eight months without the smallest alteration. Introducing a few drops of water, a diminution of about one-third of the air took place, and the remainder appeared to be phlogificated. On the 26th of May 1782, he examined a quantity of nitrous air, which had been confined with iron-flavings from the 27th of August preceding, when he found one-half of it absorbed; the remainder supported the flame of a candle better than common air; though a mouse died in it; and yet this air had continued several months in the same state with regard to quantity, nor was it at all probable that its quality would have been altered by any length of time.

Though this kind of air is produced by the contact of iron and nitrous air, the Doctor has never been able to ascertain the quantity of nitrous air which a given quantity of iron can decompose; and though iron soon becomes so much affected by this process that it crumbles into powder, it still seems equally capable of decomposing a fresh quantity. Having made a comparative experiment, by putting together one quantity of nitrous air with fresh iron and another with rust, he found that in both the air was diminished to about one-third, and a candle burned in both equally well; but neither of them had the properties of fresh nitrous air in any degree.

As the process for obtaining dephtogificated nitrous air by means of iron is very tedious, the Doctor endeavoured to find another which might be attended with less inconvenience. This he accomplished by dissolving turnings of iron in a dilute solution of copper in nitrous acid (the same that remains after the production of nitrous air), mixing it again with an equal quantity of water. Without this precaution, he tells us, that though the iron will at first be acted upon very slowly, yet the mixture will at length grow so hot as actually to boil, and the process will be exceedingly troublesome; however it will be necessary previous to any attempt to dissolve the iron, to heat the solution of copper, in order to expel all the nitrous air and superfluos
AEROLOGY.

§ 1. Vitriolic acid Air.—This is always a combination of vitriolic acid with phlogiston, and consequently may be procured from any mixture of that acid in its highly-concentrated state with phlogistic matters. Hence it is obtained from all the metals, gold and platinum excepted, by boiling them with vitriolic acid. It is also procurable from the same acid rendered black by any phlogistic matter. No greater heat is required to expel this kind of air than that produced by the flame of a candle. It is the heaviest of all aerial fluids, next to fluor acid, being to common air as $2265 : 1000$. Dr Priestley informs us, that a quantity of vitriolic acid thus impregnated with phlogiston, will yield many times more air than an equal quantity of the strongest spirit of salt. —When the vitriolic acid is produced in great plenty, the top of the phial in which it is generated is commonly filled with white vapours. The air has also the same appearance as it is transmitted through the glass tube; and it is sometimes discoverable in the Nitrous Air.

Diphlogisticated Nitrous Air. Without this precaution a quantity of common nitrous air will be produced. Diphlogisticated nitrous air is absorbed by water almost as readily as fixed air, and in considerable quantity; the liquid taking up about one-half its bulk of air. After being thus saturated, the whole quantity of diphlogisticated nitrous air may be expelled pure by heat, and is easily received in vessels containing mercury. It was likewise observed, that as this kind of air much resembles fixed air in its properties of being imbibed by water, and expelled again by heat, it resembles it also in this further property, that all the air which has been actually incorporated with the water will not be imbibed by water again. But the proportion of this part is three or four times greater than the corresponding part of fixed air; it is also considerably more phlogisticated. Water impregnated with it very soon parts with it again on being exposed to the atmosphere. —It discovers not the smallest trace of containing either acid or alkali. Its specific gravity is less than that of common air. On heating red precipitate in this kind of air, pure phlogisticated air was produced without affecting, or being affected by, the nitrous air. Repeating the experiment with malleable iron, the quantity of it was enlarged, and the whole phlogisticated, without any mixture of fixed air. By heating bits of clean crucibles or retorts in this kind of air, it seemed to approach in quality to common atmospheric air; and the effects were always found to be the more considerable the longer the process was continued. On attempting, however, to determine whether this change in the constitution of diphlogisticated nitrous air was occasioned by means of heat or light, he heated it in earthen tubes; but, found, that though these were glazed both on the outside and inside, and seemed perfectly air-tight both before and after the experiment, the air had escaped. By the electric spark it was rendered wholly immiscible with water, and brought to the standard of 1.45; so that the Doctor had no doubt of its being resipirable. Yet this kind of air, though admitted a candle in it, will not kindle pyrophorus, though the nitrous air from which it is produced would instantly set it on fire.

§ 2. Of Nitrous Acid Air.—This is the pure nitrous acid obtained by itself, without any addition of phlogiston. It is procured by heating the strong spirit of nitre in a phial, and then receiving the vapour in glass vials filled with quicksilver. It is, however, extremely difficult, or rather impossible, to preserve it for a length of time by means of any fluid hitherto known. Water absorbs it immediately, and quicksilver is corroded, and prefered duces nitrous air. "But (says Dr Priestley) tho' the acid vapour very soon unites with the quicksilver, yet of all fluids."

The most remarkable property of this vapour is, that its colour may be made more or less intense by the red colour more circumstance of heat. It may be confined in being glass vials with ground-hoppers, or in tubes hermetically sealed, and thus exposed to the action of heat: in which case it will be found, that the colour of the vapour becomes considerably more intense in proportion as the glass vial containing it is more or less heated; and that, on the contrary, the intensity of the colour diminishing as it is cooled. "It seems probable (says Dr Priestley), that if this vapour was not confined, but had room to expand itself, it would become colourless with heat. This at least is the case when it is combined with water. The phenomena I refer to are very common in the process for making diphlogisticated air, in which I first observed them. But the same things are observable in the process for producing any other kind of air in which much spirit of nitre is made use of: and likewise constantly in the common process for making spirit of nitre itself. It is, that when the heat is moderate, the vapour within the
AEROLOGY.

§ 4. Of Fluor Acid Air.—The discovery of fluor acid air was made by Mr Scheele, who obtained it by distilling the spar called fluor with vitriolic acid. Dr Priestley, who made several experiments upon the subject, was of opinion that this new acid was only the Dysfunction from vitriolic disguised by its connection with the fluor. He even supposed that he had produced it by pouring vitriolic acid on other phosphoric spars: both these opinions, however, he has now retracted, and believes the fluor acid to be one of a peculiar kind. Its most remarkable property is the great attraction it has for fleshy earth, so that it even corrodes and makes holes in the retorts in which it is distilled. See Chemistry, \( \text{Index} \).

§ 5. Of the Vegetable and other Acid Air.—By means of heat alone, the concentrated vegetable acid emits a permanently elastic and aerial fluid. This has the properties of the acid of vinegar; but, like it, is weaker than the rest of the mineral acids, though it agrees with them in its general characters. Water immingles it as readily as any of the other acid airs; olive, olive readily absorbs it, and in considerable quantity, losing at the same time its yellowish colour, and becoming quite transparent. Common air is phlogisitcated by it, as it is by the liquid vegetable acid. As the vegetable acid, however, from which this air was obtained, was distilled by oil of vitriol, the Doctor suspected that what he had examined might derive most of its properties from the oil of vitriol, and rather be vitriolic than vegetable acid air.

An acid air, somewhat different from any hitherto Air from descibed, was obtained by Dr Priestley from the solution of pour ariling on distilling to dryness a solution of gold oxide in marine acid impregnated with nitrous acid vapour, which makes the best kind of aqua regia. "The produce (says he) was an acid air of a very peculiar kind, partaking both of the nature of the nitrous and marine acids; but more of the latter than of the former, as it extinguished a candle; but it was both extinguished and lighted again with a most beautiful deep blue flame. A candle dipped into the same jar with this kind of air went out more than 20 times successively, making a very pleasing experiment. The quantity of this acid air is very great; and the residuum I have sometimes found to be phlogisitcated, sometimes phlogisitcated, and at other times nitrous air."

Sect. XII. Of Hepatic Air.

This species of air, first particularly taken notice of by Mr Bergman, who obtained it from an ore of zinc as to sink in water; and its smell is in great measure altered. Ether absorbs it very fast, and has its colour altered by the impregnation, becoming first turbid, then yellow, and at last brown. The air over the ether is strongly inflammable. A small bit of phlogorius smoked and gave light in this acid air; and the elastic into fluid was but little diminished in twelve hours. On the admission of water, about four-fifths of the gas were absorbed, and the rest was inflammable. This change was also effected by a great number of other substances: some of which, however, require a considerable time to produce their effect; such as cruts of bread not burned, dry wood, dry flesh, roasted pieces of beef, ivory, and even flints. See Chemistry, \( \text{Index} \).
Atmospheric Air.

Produced from an ounce of zinc.

The two component parts of our atmosphere, viz., dephlogisticated and phlogisticated air, have been so fully treated of under their respective sections, that little remains to be said in this place, excepting to determine the proportion in which they are usually met with in the common air. The only regular fact of experiments which have been made on this subject are those of M. Scheele. He constructed an eudiometer, consisting of a glass receiver, which could contain 34 ounces of water, and a glass cup containing a mixture of one pound of iron-filings, and an equal weight of flowers of sulphur moistened; which cup, standing upon a glass stopper, was inserted in the former receiver, which, when this was in it, could contain 33 ounces of water. To the outside of the glass tube or receiver, was affixed a flip of paper, to the height of a third of the tube, containing 11 divisions, each corresponding to one ounce of water. This paper was varnished over with oil varnish, to prevent its being spoilt by water. The whole then was placed in water, which gradually rose as the air was diminished. This mixture would serve four times before the power of diminishing air was lost. He carefully compared the height of the air therein with the barometer and thermometer, both before and after the experiment; in eight hours the experiment was completed. With this instrument he examined the goodness of the common air in Stockholm even during the winter; and found the diminution never to exceed \( \frac{1}{4} \), nor to fall short of \( \frac{1}{5} \); so that upon a medium it may be estimated at \( \frac{1}{4} \). During the months of January and February it was \( \frac{1}{4} \). The 23d of March it was \( \frac{1}{3} \), though the Atmospheric air was cold increased, and the barometer stood higher than usual before. The 19 of April in the year \( 11 \), the barometer and thermometer did not vary, and stood till the 21st. In May and June it stood between \( \frac{1}{2} \) and \( \frac{1}{3} \). The 26th of July it stood at \( \frac{1}{3} \), from the 26th to the 13th of September at \( \frac{1}{4} \), the 15th of October at \( \frac{1}{5} \), during a high flood, but after it fell between \( \frac{1}{3} \) and \( \frac{1}{4} \), till the 4th of November, when it fell to \( \frac{1}{5} \) and continued between \( \frac{1}{5} \) and \( \frac{1}{4} \), to the 20th, when it fell to \( \frac{1}{6} \) and from thence to the 31st it fell between \( \frac{1}{6} \) and \( \frac{1}{5} \).

As it has already been shown that the pure dephlogisticated part of the atmosphere is entirely contained by phlogistic procedures, such as that of fermenting brandy and iron-filings, this eudiometer must be considered as an exact test of the proportion of dephlogisticated air contained in the atmosphere. The small variation in the quantity shows that the processes in nature which destroy this air, are nearly balanced by those which produce it; though, at certain times, fermentation, by heat, and by acids, produce at all seasons of the year in a proportion nearly equal; nor is it left surprising that two fluids of unequal specific gravity should remain incorporated together without any tendency to separate, which it is certain they never do, either in the atmosphere itself, or when confined in vessels in any quantity whatever.—As phlogisticated air is somewhat lighter than dephlogisticated, it might be supposed that the former would occupy the higher regions of the atmosphere in such a manner as to render them considerably more unhealthy than the lower parts; but this seems not to be the case: On the contrary, it appears from experiments with the eudiometer, that the upper parts of the air contain a greater proportion of dephlogisticated air than those near the earth. See EUDIOMETER.

Proportion of the two ingredients of which it is composed.

Sec. XIII. Of Atmospheric Air.

Sect. XIV. Of the artificial Production of Airs of different Kinds.

§ 1. Fixed Air, or Aerial Acid. The artificial methods of producing this are principally three, viz., by fermentation, by heat, and by acids.

(1) By Fermentation. When vegetable or animal substances, especially the former, are fermented, they yield a great quantity of fixed air. In breweries, on the surface of the fermenting liquor, there is always a stratum of fixed air reaching as high as the edge of the vats; so that if these vessels are deep, and the fermenting liquor much below their edges, the abovementioned stratum may be some feet in thickness. The same phenomenon is observable in the fermentation of wines in general; and it is owing to the production and elasticity of fixed air, that fermenting liquors, which put into close vessels, often burst them with great violence. The cause is the same whatever substance it is that undergoes the vinous fermentation, though the quantity of fixed air produced is not the same in all substances, nor even in the same substance at different times. From 42 cubic inches of beer Dr. Hales obtained 58 cubic inches of air in 13 days. From a quantity of sugar...
undergoing the vinous fermentation, Mr Cavendish obtained so much fixed air, that out of 100 parts of the former 57 appeared to have been volatilized and converted into fixed air.

But though a vast quantity of fixed air escapes during this process of fermentation, a very considerable portion still remains united with the fermented liquor, and to this it owes all its briskness and agreeable pungent acidulous taste; for when the fixed air is totally evaporated, the liquor becomes entirely vivid and flat. Hence also we are furnished with a method of restoring the briskness to these liquors after they have lost it in consequence of being exposed to the atmosphere, viz. by impragnating them again with fixed air, either naturally or artificially produced.

Dr Priestley has made several experiments in order to determine the quantity of fixed air contained in several sorts of wine. His method was to take a glass phial (fitted with a ground stopple and tube), capable of containing 1 ounce-measure. This he filled with wine, plunged it into a proper temperature, and then put over the fire, and the water, into the quicksilver, into the top, pulling out part of the metal and taking its place. The result of his experiments was as follows:

<table>
<thead>
<tr>
<th>Wine</th>
<th>Fixed Air Contained</th>
<th>of an Ounce Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Madeira</td>
<td>2 oz. meaf.</td>
<td>of an ounce</td>
</tr>
<tr>
<td>Port of five years</td>
<td>1 oz. meaf.</td>
<td>of an ounce</td>
</tr>
<tr>
<td>Hock of five years</td>
<td>1 oz. meaf.</td>
<td>of an ounce</td>
</tr>
<tr>
<td>Tokay of 16 years</td>
<td>2 oz. meaf.</td>
<td>of an ounce</td>
</tr>
<tr>
<td>Champagneo two years</td>
<td>3 oz. meaf.</td>
<td>of an ounce</td>
</tr>
<tr>
<td>Bottled cyder of 12 years</td>
<td>3 oz. meaf.</td>
<td>of an ounce</td>
</tr>
</tbody>
</table>

During the acetous fermentation also, liquors emit a vapour, great part of which is fixed air, though the nature of its other component parts has not yet been thoroughly ascertained.

Fixed air is likewise produced, though in no great quantity, by putrefaction. In this case, however, a great part of the elastic fluid consists of inflammable and phlogificated air, and the fixed air itself seems to be intimately connected with a putrid offensive effluvium. It seemed to Dr Priestley to "depend in some measure upon the time and other circumstances in the distillation of animal or vegetable substances, whether they yield the proper putrid effluvium, or fixed or inflammable air."

The elastic fluid produced by putrefying vegetables, when kept in a moderate degree of heat, is almost all fixed air; while that from animal substances contains several times more inflammable than fixed air. Vegetable substances yield almost all the permanently elastic fluid in a few days, but animal bodies continue to emit it for several weeks. When the elastic fluid yielded by animal substances is absorbed by water, and that water boiled, the fixed air may then be obtained without any mixture of the putrid effluvium. It is also to be observed, that the quantity of elastic fluid producible from animal substances is various according to the nature of the parts of the animal employed. Thus the muscular parts will yield less elastic fluid, and also

lefs mixed with any putrid or offensive effluvium, than a whole animal, or than the liver, &c. The proportion of inflammable and of fixed air is also various, according to the various parts employed.

(2.) By heat. In every combustion, except that of sulphur or of metals, a quantity of fixed air is generated. This may be observed by fixing a lighted candle in an inverted receiver over a basin of lime-water, for a precipitation of the lime will presently ensue; and the same precipitation is one of the characteristics of fixed air will always ensue, whether a candle, a burning piece of wood, or, in short, any other combustible substance, except sulphur or metals, be made use of.

During this production or extraction of fixed from atmospheric air, the latter is commonly supposed to be considerably diminished, though M. Lavoisier and Mr Scheele have now rendered that opinion doubtful. If a piece of charcoal be burned by throwing the focus of a lens upon it when contained in a glass-receiver inverted in water, after the apparatus is cooled, the water will have mounted a small way into the receiver. The diminution, however, is limited, and depends on several circumstances. Dr Hales has observed, that, in equal receivers, the air suffers a greater diminution by burning larger candles than small ones; and likewise, that, when equal candles are made use of, the diminution is greater in small than in large receivers.

The cause of this phenomenon probably is, that the air contained in the receiver cannot all come into contact with the flame of the candle; whence, as soon as the air which is nearest the flame becomes contaminated, the candle is extinguished. Thus the author of a Concise Treatise on the Various kinds of Permanently Elastic fluids, has diminished the air of an inverted receiver one sixth part, by moving the candle whilst it burned through the different parts of the vessel, so that the flame was brought into contact with a greater quantity of the confined air than if it had remained in one situation all the time. It became extinct, Dr Mayow observed, that by the burning of a candle the air was diminished of one thirtieth only; Dr Hales found it to be diminished of one twenty-fifth part; and Dr Priestley found it to be diminished of one fifteenth or sixteenth. Mr Cavendish observed, that air suffered a diminution of one-tenth of the whole quantity, by passing through an iron-tube filled with red-hot powder of charcoal. A candle, or any other combustible body, will cease to burn by itself, and consequently to contaminate a quantity of confined air much sooner than it is, in some manner, forced to burn by the external application of heat. "The focus of a burning mirror," says Dr Priestley, "thrown for a sufficient time either upon brimstone or wood, after it has ceased to burn of its own accord, and has become charcoal, will have a much greater effect of the same kind, diminishing the air to its utmost extent, and making it thoroughly noxious." The combustion of the phosphorus of urine diminishes air in a great degree. Mr Lavoisier has observed, that by the combustion of phosphorus, air may be diminished of about one-fifth or one-sixth. This accurate philosopher has also observed, that the acid of phosporus thus formed, acquires the weight lost by the diminished air; finding that about three inches of air were absorbed by every
AEROLOGY.

Of Artificial Airs.

...one grain of phosphorus, when the experiment was tried with a receiver inverted in water, upon the surface of which a small quantity of oil had been introduced; but when the receiver was inverted in quicksilver, the absorption was constantly between two and three grains for each grain. Mr Capello mentions having often repeated the experiment of burning phosphorus in a glass tube inverted in water, by applying the closed part of the tube, wherein the phosphorus was contained, to a pretty strong fire, when he always observed that the utmost diminution of the inclosed air effected by this means was full one-fifth.

Dr Hales remarked, that after the extinction of candles in a receiver, the air continued to diminish for several days after. This may be owing to the gradual absorption of part of it by the water; it having been remarked by Dr Priestley, "that this diminution of air by burning is not always immediately apparent, till the air has passed several times through water; and that when the experiment was made with vessels flanding in quicksilver instead of water, the diminution was general, inconvenient to the air had passed through water."

In these experiments of burning combustible bodies in a quantity of air, and measuring the diminution, we should always remark two cauages of mistake, viz. the absorption of air by the coaly residuum of the burnt matter, which sometimes is very considerable, or by the fluid in which the receiver is inverted, and the production of elastic fluid from the burning substances; thus gunpowder generates a great quantity of elastic fluid when inflamed, &c.

Even the electric spark separates fixed air from common atmospheric air; for when a number of these sparks are taken in a small quantity of common air over lime-water, a diminution will take place, the lime will be precipitated, and if we put a blue vegetable juice instead of the lime-water, it will be turned red by the acidity of the fixed air deposited upon it. Dr Priestley having cemented a wire into one end of a glass tube, the diameter of which was about one-tenth of an inch, and having fixed a brass ball to that extremity of the wire which was out of the tube, filled the lower part of it with the juice of turpentine or archil, so that a quantity of common air was contained in the tube between the extremity of the wire and the surface of the liquor. Then taking the electric spark between the said wire and liquor for about one minute, the upper part of the liquor began to look red, and in about two minutes it was manifestly so. The air at the same time, was diminished in proportion as the liquor became red; but when the diminution arrived to be one-fifth of the quantity of the air contained, then a longer electrification produced no sensible effect. "To determine," says the doctor, "whether the cause of the change of colour was in the air or in the elastic matter, I expanded the air which had been diminished in the tube by means of an air-pump. till it expelled all the liquor, and admitted fresh blue liquor in its place; but after that, electricity produced no sensible effect, either on the air or on the liquor; so that it was evident that the elastic matter had decomposed the air, and had made it deposit something that was of an acid nature."

The calculation of metals, as already observed, phlogisticates, and consequently diminishes common air; but does not produce any fixed air, since the lime-water, over which the calcination is made, does not become turbid; and when metallic calxes are exposed to a sufficiently strong heat, they in general yield some fixed air, so that it seems that the fixed air produced in the calcination of metals is absorbed by the calx. Some fixed air may be obtained from red lead, by no greater degree of heat than that of the flame of a candle applied to the phial that contains it.

The calcareous earths, which, when acted on by acids, yield a vast quantity of fixed air, produce a very small quantity of it when exposed to a strong heat by themselves, in a proper vessel, even when exposed to the focus of a lens. Dr Priestley, in his experiments relating to the production of dephlogisticated air from various substances, when moistened with nitrous acid, and afterwards exposed to a sufficient degree of heat, generally found that some fixed air was produced together with the dephlogisticated air; but often obtained fixed air only, without any dephlogisticated air being mixed with it, or fixed and nitrous air together. From half an ounce of rust of iron, moistened with spirit of nitre, and dried, he obtained about a quart of elastic fluid, about one-third of which was fixed and the rest nitrous air. From ashes of pit-coal, treated in the same manner, he obtained nearly the like result. But in those experiments, the Doctor mostly used a gun-barrel, into which he introduced the substances to be tried; so that it is very probable, as he judiciously observes, that the iron might have contributed to the formation of the fixed air. In fact, when he tried substances of the same sort, first in a gun-barrel and then in glass vessels, he obtained much more fixed air in the former than in the latter case. One of these experiments he made with tobacco-pipe clay, which, after being moistened with spirit of nitre, was when dry exposed to the fire in a gun-barrel, and yielded some elastic fluid, which appeared to be wholly fixed air; but repeating the experiment in a glass phial with a ground stopple, and taking the produced elastic fluid at eight different times, found that on the beginning some fixed air was produced, but afterwards the produce was dephlogisticated air. He made a similar experiment with flints carefully calcined in clove vessels, and obtained a similar result.

Most minerals contain fixed air, which may be extracted to a certain degree by means of heat. Most minerals, Krenger, distilling a greenish flufible spar, which was raluminous in the dark, obtained from it some permanently elastic fluid, which, like fixed air, crystallized a solution of fixed alkali. Mr Fontana in his analysis of the malachite, finds that that mineral contains a vast quantity of fixed air, as pure as that which is extracted from chalk by means of vitriolic acid.

From almost every metallic ore and earthy mineral some fixed air may be obtained, as well as from chalk, lime-dense, marble, marine shells, fixed and volatile alkali, and from magnesia alba, by means of a violent fire, or of acids.

In Mr Boyle’s, Dr Boerhaave’s and Dr Hales’s works, and in other books, the quantities of elastic fluid generated in various processes, and by divers substances, are mentioned with distinction, but as those writers are not acquainted with the characteristic properties of fixed air, we do not know whether the elastic fluid mentioned by them was pure fixed air or not.
From animal substances, mixed with spirit of nitre, and sometimes heated a little, in order to facilitate the production of elastic fluid, Dr Priestley obtained, in general, fixed air; but whereas the fixed air produced by a similar process with vegetable substances is mostly mixed with nitrous air, this is mixed with an elastic fluid, which is seldom nitrous in a very slight degree, but is often phlogisticated air, viz. in such a state as extinguishes a candle, does not dim nitrous common air, nor is itself diminished by nitrous air. Towards the end of the process, the Doctor remarks, that when by means of a strong heat, the produce of air is very rapid, and the air full of clouds, it is, like air, produced from vegetable substances in the same circumstances, slightly inflammable; burning with a lambent, greenish, or bluish flame.

(3.) By acids. Calcareous substances in general produce abundance of fixed air when acted upon by any acid, only the strongest acids will expel from them more fixed air than the weakest; and it happens to be particularly advantageous for those who want to produce a great quantity of fixed air, that the vitriolic acid is both the cheapest and strongest, and, upon the whole, the fittest for this purpose. The phenomena attending the production of fixed air from calcareous substances, &c. are themselves very remarkable, and furnish the subject of much speculation in philosophy.

—The principal facts are the following. 1. When calcareous earths, alkalis, and magnetia, in their usual state, are mixed with acids, they cause an effervescence; and consequently the production of a permanently elastic fluid, namely, fixed air. 2. These substances retain the fixed air very obstinately; so that a strong fire is necessary to expel it from magnesia, and the strongest is not sufficient to expel it entirely from fixed alkalis, and especially from calcareous earths (a). When these substances are treated with acids, they yield the fixed air, because they have a stronger attraction to those acids than the fixed air.

3. The calcareous earths which are insoluble in water, when deprived of the fixed air become soluble in it. Thus lime-stone is not soluble in water, but lime (viz. lime-stone deprived of its fixed air) is soluble in water. And if those substances, deprived of their fixed air, are put in a situation proper to recover their lost fixed air, they lose the property of being soluble in water. Thus, when lime-water is exposed to fixed air, the lime absorbs the fixed air; and, losing at the same time its property of being soluble in water, is precipitated from it in the state it was before calcination, viz. of a calcareous earth in soluble in water, and capable of effervescing with acids. 4. Alkalis, both fixed and volatile, when deprived of their fixed air, become more caustic, and more powerful solvents, incapable of crystallisation, and of effervescing with acids. But if those alkalis, and also earths rendered more caustic, their fixed air be restored, they acquire at once all the properties they had before they were deprived of the fixed air, viz. they become more mild, effervescence with acids, recover their weight, &c.

Those properties of calcareous earths and alkalis were ascertained by the learned Dr Black, who performed a variety of decisive and well-contrived experiments, upon which he formed a just theory, viz. that the causticity, sharpness, solubility, &c. of those substances, was owing to the fixed air being expelled from them; and that when they were combined with a proper quantity of fixed air, they were mild, &c. The Doctor gives the epithet of nitile to those substances when they are combined with air, and of calcarie when deprived of it; as calcareous earth, calcatic fixed alkali, &c. Among the other experiments, he connected two phials by means of a bent tube; in one of which he put some caustic spirit of Paris ammonia; and in the other, some mild alkali, or mild calcareous earth; then pouring, through a hole made in the side of the latter phial, some acid upon the mild alkali, so as to produce some fixed air, which, passing through the tube into the other phial, combined with the spirit of Paris ammonia, and rendered it mild.

Early methods of obtaining Fixed Air for occasional Experiments, &c.

1. By Fermentation. Mix together equal parts of brown sugar and good yeast of beer, to which add about twice the bulk of water. This mixture, being put into a phial, to which a bent tube with a cork may be adapted, will yield a considerable quantity of fixed air, which may be received into a phial filled with quicksilver, or water, as in the following process.

(a) Chalk, lime-stone, &c. after being kept in a very strong fire for many hours, if they are put into acids, yield a considerable quantity of fixed air; which shows that the purest quick-lime contains some fixed air.
fing through the water, ascend to the top of the inverted bottle. In proportion as the elasic fluid fills the bottle \( K \), the water gradually descends, and at last is quite expelled from it; the bottle \( K \) then is filled with fixed air, and being corked under water, may be removed from the basin, and kept for use. Another bottle may then be filled with water, and may be inverted over the extremity of the bent tube in the place of \( K \), which other bottle may be filled in a similar manner, and so on till the mixture in \( F \) has finallized to yield any fixed air.

If one of these bottles filled with fixed air be un­ corked, and, holding it with the mouth upwards, a lighted wax taper, bent like \( L \), or a small piece of it affixed to the extremity of a wire, be immediately let down in it, the flame will be instantly extinguished. The same thing will happen if a lighted piece of wood is let down in it.

Take a clean bowl, and putting the mouth of a bottle, filled with fixed air, in it, uncook it, and keep it in that situation for about a minute. The fixed air being specifically heavier than common air, will come out of the bottle, and will remain at the bottom of the bowl, whilst common air enters into the bottle; which bottle may now be removed; and, in order to show the real existence of the fixed air, which will immediately show its being heavier than common air, put a lighted wax-taper into the bowl, pretty near its bottom, which taper will be extinguished immediately. The air in this experiment must be agitated as little as it is possible. That the flame of the wax taper was really ex­ tinguished by the fixed air, may be easily proved in the following manner:— Blow once or twice into the bowl, by which means the fixed air will be expelled from it; and then, on letting down a lighted wax-taper in it as before, it will be found that it is no longer extinguished, but will burn very well, the bowl being now filled with common air. This experiment never fails of sur­ prising the speculators, as it clearly exhibits two remark­ able properties of a fluid, which they can neither see nor distinguish by the feeling.

When the bottle \( K \) is about half filled with fixed air, put a mark with a bit of soft wax on the outside of it, just coinciding with the level of the water in it, and immediately after shake the bottle; but taking care that its mouth be not lifted above the surface of the water in the basin. After having shaken it for about a minute, on intermittently the agitation, it will be found that the water is above the mark; which shows that some of the fixed air has been absorbed by it. Let this abstraction be carried on as far as possible, by agitating the bottle repeatedly, and allowing time to let more fixed air be produced and enter into the bottle in proportion as the water absorbs it. Then apply the hand, or a finger, to the mouth of the bottle whilst under water; bring the bottle out, and turn it with the mouth upwards. The water then will be found to have acquired a pleasan acidulous taste. The water thus impregnated with fixed air changes the blue infusion of some vegetable substances into red; so that if a few drops of heliotrope be mixed with it, or indeed if it is simply exposed to fixed air, the liquor acquires a reddish appearance. It also corrodes iron, and some other metals, much more easily than common water.

But the greatest and most useful property of this acidulated water, or water impregnated with fixed air, is its being a powerful antiseptic. As the most used mineral waters are medicinal principally on ac­ count of their being impregnated with fixed air, besides which they generally contain some small portion of metal or salt dissolved; they may be imitated by impreg­ nating water with fixed air and then adding that quantity of salt or of metal, that by analysis the original mineral waters are found to contain.

It is for this great property of hindering putrefaction, that fixed air by itself, or incorporated with various fluids, especially with water, and that vegetables, sugar, and other substances which abound with fixed air, are very powerful remedies in putrid diseases. Sir John Pringle supposes, with great probability, that the frequent use of sugar and vegetables, which at this time make up a considerable part of the diet of the European nations, prevents these putrid diseases and plagues which formerly were rather frequent.—Dr Macbride, showing experimentally that fixed air is discharged by such substances as form our common food, ascribes the preservation of the body from putre­ faction in great measure to the fixed air, which in the ordinary process of digestion is disengaged from the aliment, and incorporates with the fluids of the body.

From the same property it may be also usefully ap­ plied to several economical purposes. Mr Henry found, that fixed air can preserve fruit for a consider­ able time. He tried a bunch of Italian grapes, which being suspended in the middle part of Dr Nooth’s apparatus, and being supplied with plentiful streams of fixed air every day, was prepared without any signs of decay for about one month longer than a similar bunch suspended in a decanter containing common air. Straw­ berries and cherries he also found to be preserved without decay some days longer in fixed than in common air. Indeed fixed air preserves not only fruit, but refits putrefaction in general. Dr Macbride, in his elegant essays on Medical and Philosophical Subjects, has published various experiments which demon­ strate this property of fixed air. He found, that not only good meat was preserved incorrupt for a con­ siderable time, when exposed to fixed air; but that the putrefaction of substances actually putrid was im­ peded by this means, and even that these substances were restored from the putrefaction to a found state. That putrefaction was checked by fermentation, was sub­ duced by Sir John Pringle; and Dr Macbride ob­ served, that this effect was owing to the fixed air pro­ duced in the act of fermentation. But it must be ob­ served, that when the found, or even putrid sub­ stances, expose a very great surface to the fixed air, as is the case with milk, bile, and other fluids impreg­ nated with fixed air, and also with small bits of meat, then they are preserved for a considerable time: but large pieces of solid animal substances, as for instance roundish pieces of flesh of about half a pound weight, do not seem to remain incorrupt much longer in fixed than in common air; at least the difference is inconsiderable. Sir William Lee, baronet, in two of his letters to Dr Priestley, informs him of his having found, that flesh-meat, even in the hot season, could be pre­ served wholesome for several days, by only walking it two or three times a-day in water impregnated with fixed
AEROLOGY.

Sect. XIV.

Of Artificial Airs.

fixed air. "We have been enabled," says he, "to preferve meat as perfectly sweet and good to the extent of ten days, as at the first killing; and there seems no doubt it might be preferred much longer." He has even recovered some meat that had begun to change. This useful discovery, Sir William Jolly observes, may be very beneficial to the public, espe- cially to butchers. "Particularly a butcher," says he, "who deals pretty largely, affures me he found the greatest success from it, and only objects that the veal was a little discoloured though kept perfectly sweet."

Fixed air, as it combines with water, fo it may be combined with other liquors. Beer, wine, and other fermented liquors, may be impregnated with fixed air, and by this means their flavour may be restored, when they are become vapid, or as it is commonly said, dead. The acridulous tafte communicated by the impregnation of fixed air, cannot be discovered in beer, wines, and, in short, in fuch liquors which have much tafte of their own. Milk acquires an acridulous tafte by being impregnated with fixed air, and is thereby preserved incorrupt for fome days; which affords a very easy expedient of preferving milk in thofe places where it cannot be had new often.

§ 2. To produce inflammable air.—The procefs for making this fort of gas is the fame as that for making fixed air: one of the materials only must be different, viz. iron-filings, or grofsly powdered zinc, must be used infted of chalk; to which fhalings some oil of vitriol and water muft be added, in the fame proportion as in the fixed air, or rather a little more of oil of vitriol.

N. B. Instead of the filings of iron, fmal nails, or small bits of iron-wire, answer equally well. The inflammable elastic fluid produced by this mixture has a displeasing fmall, even when mixed with a very large quantity of common air: fo that if any coniderable quantity of it comes out of the bottle, before the cork with the bent tube be applied to it, &c. its fmall may be perceived all over the room in which the experiment is made, but this fmall is not particularly offensive.

When a bottle has been filled with this elatic fluid, flop the mouth of it with your thumb, or any flopper, and taking it out of the baflon, bring it near the flame of a candle; and when the mouth of the bottle is very near it, remove the flopper, and the elatic fluid contained in the bottle will be immediately inflamed; and if the capacity of the bottle is nearly equal to four ounce-meafures, it will continue burning quietly for about half a minute, the flame gradually decending lower and lower, as far as about the middle of the bottle, in proportion as the inflammable gas is consumed.

In this experiment we fee, that inflammable air follows the general rule of all other combustible substances, namely, that of burning only when in contact with common air: thus the flame of this gas, whilst burning, is obfervable only on that face of it which is contiguous to the common air; fo that if the bottle be closed, the flame is put out immediately, because the air is intercepted from it. But if the inflammable air were put in fuch a situation as to expose a very great surface to the common air, it is plain, that by this means its combustion would be accelerated, fo as to let it burn infinitely, and go off with an explosion, caufed by the sudden rarefaction of the air. In fact, this effect may be easily obferved in the following maner: When the bottle is to be inverted into the baflon, in order to let it be filled with the inflammable gas, instead of filling it entirely with water, let half of it remain filled with common air; then invert it, and let the other half, which is now filled with water, be filled with inflammable air after the usual maner; and when the bottle is full, remove it in the manner shewn above, and approach it to the flame of the candle, by which means the inflammable air takes fire; but now it explodes all at once with a large flame and a confiderable report, sometimes breaking the bottle in which it is contained. In this cafe, the bottle being filled with equal parts of inflammable and common air, thefe two elatic fluids were mixed together, fo that almoft every particle of the one touched every particle of the other, and hence the sudden combustion was occafioned. The force of this explosion is fo very confiderable, that fome piitols have been contrived, which are charged with a mixture of air and inflammable gas; and being fired by means of an electric spark, are capable to drive a leaden bullet with great violence. Sometimes fome piitols are made of glafs (but in this cafe they are not charged with a bullet), and it is very diverting to fee that piitols are charged and exploded by the combustion of an invisible fubfance.

When a flender pipe is tied to the neck of a bladder, and the bladder is filled with inflammable air, after the manner defcribed in the preceding experi- ment (viz. when the bladder was required to be filled with fixed air), two very pleasing experiments may be performed with it. First, the inflammable gas may be inflamed by applying the flame of the candle to the extremity of the pipe; and fqueezing at the fame time the bladder, a stream of fire will be formed in the air, which will last as long as the bladder contains any inflammable air; for this gas coming out of the pipe with violence, will continue inflamed for a confiderable way in the air. Secondly, the extremity of the pipe may be dipped into a folution of foap, then removing it from the folution, and fqueezing the bladder very gently, a ball of foap-water may be formed, including inflammable air; which ball, on account of the inflammable gas being much lighter than common air, as far as it is detached from the pipe will ascend upwards, and will break by dashing against the ceiling, contrary to thofe commonly made by children, which in still air go downwards.—Whilft the ball is ascending, if the flame of the candle be approched to it, the film of foap-water will be infinitely broke, and the inflammable air will take fire; thus a flame may be shown to be feemingly produced from a foap-ball. By taking electric fparkes in any kind of oil, spirit of wine, ether, or spirit of falk ammoniac, Dr Prieftley obtained inflammable air. The oil, or other liquid, was confined in a glafs tube by quickfiver, and a wire was cemented in the upper part of the tube, through which the fparks being tent, went to the quickfiver through the oil; but after that a few fparks had been taken, a quantity of inflammable air was generated, &c. Left the production of inflammable air should be attributed to the cement which fastened the
Sect. XIV.

A E R O L O G Y.

By means of nitrous acid, inflammable air may be obtained from various substances containing phlogiston, but it is always mixed with nitrous air, and sometimes also with fixed and common or phlogisticated air. If two parts of spirit of wine, mixed with one part of nitrous acid, are put into a phial with a ground-funnel and tube, and the flame of a candle be applied to it, so as to heat it gradually, the inflammable air will be produced very readily; the inflammability of which is, however, not very permanent, for by a little washing in water it may be annihilated. In the solution of most substances in nitrous acid, it generally happens, that the elastic fluid, which is obtained towards the latter end of the process, posesses the property of being inflammable: thus iron, dissolved in nitrous acid, yields nitrous air; but when the nitrous air ceases to be produced, if the heat of a candle be applied to the solution, more elastic fluid will be produced which is inflammable. “The nitrous acid (says Dr Ingenhouz) when mixed with iron-fillings in a very diluted state, gives, by the assistance of a moderate degree of heat, a mixture of different airs, partly fixed, partly common air, and partly phlogisticated air. See further the article AEROSTATION.

§ 3. To produce Nitrous Air.—This permanently elastic fluid is never found naturally, like fixed or inflammable air, but is entirely artificial.

Either silver, copper, brass, iron mercury, bismuth, Nitrous air or nickel, when mixed with nitrous acid, yield nitrous air entirely in great quantities. Some of them, especially mercu- ry, require the aid of heat in order to produce the elastic fluid; the flame of a candle applied to the phial is sufficient: but others, especially copper and iron, do not want the application of any heat. Gold platina, and the regulars of antimony, when put in aqua regia, yield nitrous air pretty readily. Among the metals, lead yields nitrous air in the smallest quantity. “I poured (says Dr Priestley) smoking spirit of nitre into a phial with a ground-funnel and tube, containing 1/2 ounce-measure filled with small leaden shot, so as to leave no common air at all, either in the phial or in the tube; and I placed it so as to receive the air that might come from it in water. After waiting an hour, in which little or no air was produced, I applied the flame of a candle, though not very near, to it: and in these circumstances I got about an ounce-measure of air: but upon some water running into the phial while the candle was withdrawn, air was produced very plentifully. I collected in all about a quarter of a pint, and might probably have got much more, but that the falt formed by the solution of the lead had so nearly closed up the tube, that I thought proper to discontinue the process. The air, both of the first and of the last produce, was of the same quantity; and so far nitrous, that two measures of common air, and one of this, occupied the place of two measures only; excepting that the very first and very last produce, mixed with common air, took up a little more room than that which I got in the middle of the process. When the air was produced very fast, it was exceedingly turbid, as if it had been filled with a white powder.”

Among the semi-metals, zinc gives the weakest nitrous air, when dissolved in nitrous acid. The elastic fluid
of artificial Air.

From four pennyweights and 17 grains of zinc, dissolved in spirit of nitre diluted with an equal quantity of water, Dr Priestley obtained about 12 ounce-measures of very weak nitrous air. It occasioned a very slight effervescence when mixed with common air. The Doctor obtained nitrous air even from some flowers of zinc (as he) mixed a quantity of blue spirit of nitre with flowers of zinc, which were of a dull colour, and appeared from several experiments to contain a portion of phlogiston, it yielded, with the heat of a candle applied to the phial which contained it, strong nitrous air; when the common spirit of nitre, applied in the same manner, gave only phlogificated air; the phlogiston of which came probably from the caulk itself, though a small portion of it might have been in the nitrous acid, which I believe is never entirely free from it.

The quantity of nitrous air that may be obtained from various metals, is difficult to be ascertained, on account of the diversity occasioned by the strength of the acid, the various nature of the metallic substance, and the method of performing the experiments. The following is a table of the produce of nitrous air from various metals, extracted from Dr Priestley's first volume of Experiments and Observations; but which, as the author himself intimates, is far from being very accurate.

dwt. grs.

6 0 of silver yielded 17 ounce-measures.
5 19 of quicksilver, 44
1 24 of copper, 144
2 0 of brass, 21
0 20 of iron, 20
1 5 of bismuth, 6
0 12 of nickel, 4

The various strength of the nitrous acid produces great diversity in the production of nitrous air. Thus, if copper is dissolved in strong nitric acid, it will not produce the least quantity of nitrous air; but when dissolved in diluted nitric acid, it produces a great quantity of that elastic fluid. The strong and pale-coloured nitrous acid should be diluted with at least two or three parts of water to one of the acid, for the easy production of nitrous air from copper and mercury.

The briskness of the effervescence, and the production of nitrous air, are promoted by heat, and also by letting the metallic substance present a great quantity of surface to the acids.

For the generality of experiments, no other degree of heat is required than that produced by the effervescence itself, except mercury be used, which requires the application of some heat. When the metal exhibits a very great surface to the acid, as is the case when filings are used, the effervescence and production of nitrous air are often much quicker than can be conveniently managed.

Copper or brass, when clipped into flat bits, each about two or three grains in weight, and about a quarter of an inch in surface, and when dissolved in nitrous acid properly diluted, yield nitrous air very equably; but if they be used, the pieces of it should be much larger and fewer; in short, it should present a much larger surface to the diluted acid; otherwise the increase of heat in the process, and the rapid production of elastic fluid, render the operation both difficult and dangerous for the operator.

As the nitrous air is mostly necessary to try the goodness of respirable air, it is of great consequence to make it always of one constant degree of goodness; pure mercury yields a very homogenous nature in the nitrous acid; therefore it is plain, that the metals whole nature is more uniform must be preferred for this purpose. Accordingly, brass yields nitrous air of a more uniform nature than iron: copper is superior to brass; but pure mercury is still superior to copper: and indeed this is the metal which, considering its nature, uniformity of substance, and easy solution, is upon the whole the most useful for this purpose.

It has been generally observed, that solid vegetable substances, when dissolved in nitrous acid, yield more nitrous air than the animal substances, though this nitrous air is not so pure as that obtained from metals.

Sometimes it contains some fixed air, and a good deal of inflammable air which is mostly produced towards the end of the process. On the other hand, the nitrous air, extracted from animal substances generally contains a good deal of phlogificated air, and sometimes some fixed air. In order to obtain nitrous air from the solution of animal and vegetable substances in nitrous acid, often some degree of heat must be applied to the phial. The acid also sometimes must be very concentrated, and in other cases it must be diluted; but it is hardly worth while, or practicable, to determine with exactness all those particular cases.

To make Nitrous Air.—The metal, viz. copper, brass or mercury, is first put into the bottle (which, as well as the whole process, is the same as that described for fixed Air), so as to fill about one-third of the same; then some water is poured into the bottle, so as just to cover the metal-filings; and lastly, the nitrous acid is added, the quantity of which, when strong, should be about one-third or half the quantity of the water. The smell of the nitrous gas is very penetrating and offensive, and occasions a red smoke as soon as it comes into contact with the common air; hence whenever any of it escapes from the bottle, it may be observed not only by the smell, but also by the slight red colour.

In order to observe the principal property of this elastic fluid, which is that of diminishing the bulk of common air, let a glass tube, closed at one end, and about nine inches long, and half or three quarters of an inch in diameter, be filled with water, and inverted in water; then take a small phial, of about half an ounce-measure, filled with common air, and plunging it under the water contained in the same basin where the inverted tube is kept, let that quantity of air enter into the tube, which will go to the top of it, the water subsiding accordingly. Let a mark be made, either with a file or by sticking soft wax on the tube, just opposite to the surface of the water in it, which will mark how much the tube is filled by that given measure of air. After the same manner, fill the same small phial (which we shall call the measure) again with air, throw that air into the tube, and put a mark on the tube coinciding with the level of the water in it. In this manner, let four or five measures be marked on the tube. Now, if three measures of common air are put
AEROLOGY.

§ 4. To procure Dephlogisticated Air.—This is no other than exceedingly pure atmospheric air, entirely free from those heterogeneous vapours which contaminate the air we commonly breathe. The easiest method of procuring this air is to put the red-lead into the bottle, together with some good strong oil of vitriol, but without any water. Let the red-lead fill up a quarter of the bottle, and the vitriolic acid be about the same quantity or very little less; then apply the bent tube to the bottle, and proceed in the same manner as above. But it must be remarked, that without heat this mixture of red-lead and vitriolic acid will not give any dephlogisticated air, or it yields an inconsiderable quantity of it; for which reason the flame of a candle (that of a wax taper is sufficient) must be applied under the bottom of the bottle; which for this purpose must be rather thin, otherwise it will be easily cracked. In this manner the red-lead will yield a good quantity of elastic fluid, the greatest part of which is dephlogisticated air; but not the whole quantity of it, for a good portion of fixed air comes out with it. In order to separate the fixed air from the dephlogisticated air, the inverted bottle, when filled with the compound of both, as it is emitted from the red-lead, must be shook in the basin for impregnating water with fixed air; by which means the water will absorb the whole quantity of fixed air, and leave the dephlogisticated air by itself.

From every experiment it appears, that dephlogisticated air, if it could readily be obtained, and at a cheap rate, would be a most valuable manufacture. The heat communicated by means of it to burning fuel is incredible.

These are not the only advantages which might be expected from dephlogisticated air. It has been found by experience, that animals will live much longer in this kind of air than in an equal quantity of common air; whence it is supposed, that the breathing of it must be much more healthy, and contribute to longevity much more than the common atmosphere. Nay, there are not wanting some who attribute the longevity of the Antediluvians to the great purity of the atmosphere at that time; the whole mass being afterwards tainted by the déglutine, in such a manner that it could never regain its former purity and salubrity. But all this as yet is mere conjecture; and excepting the single fact, that animals live much longer in a quantity of dephlogisticated than of common air, there is no evidence that the former contributes more to longevity than the latter.

Dr Priestley even throws out a conjecture, that the use of dephlogisticated air might perhaps wear out the system much sooner than common air, in the same manner as it consumes fuel much faster than common air. The great quantity, however, even of the purest air, which is requisite to support animal life, and the expense and trouble of the most ready methods of procuring it, have hitherto prevented any fair trial from being made. Yet philosophers, considering the probability there is of this kind of air being salutary in many diseases, having bestowed some pains in attempting to find out methods of procuring it easily and in large quantity, we may remark, which we have the following observations in Cavallo's Treatise on Air.

"A man makes in general about 15 inspirations in a minute, and takes in about 30 cubic inches of aerial fluid. But the air which has been once inspired is not thereby much injured, and it may be respired again and again; so that upon a very moderate calculation, and as appears from actual experiments often repeated, we may safely assert, that a person can breathe 300 cubic inches of good ordinary atmospheric air, at least 30 times, without any inconvenience, i. e. it would serve for two minutes; after which that air, though much depraved, is still in a state of being breathed, but then it would occasion some uneasiness. Now, supposing the dephlogisticated air employed to be four times more pure than common air, 400 cubic inches of dephlogisticated air would serve for at least 120 respirations or eight minutes."

"But supposing that 30 inches of common air are completely phlogisticated by a single inspiration, and changed for such as is quite fresh, which indeed is the case in common respiration, then 450 cubic inches of common air will be requisite for one minute's respiration, and 27,000 for one hour; and as dephlogisticated air is supposed to be four times as good, the same quantity of it will serve for four hours. Indeed, if we could depend on the assertions of Mr Fontana, that by adding lime-water to absorb the fixed air produced by respiration, an animal can live 30 times as long as without it, no doubt a much smaller quantity would serve."

But it is certain such assertions cannot be true; because, though the fixed air should be absorbed as soon as produced, the remaining quantity would still be contaminated by phlogiston. Nay, we are informed by Dr Priestley, who repeated Fontana's experiments, that

(A) In this operation the flame of the candle, when once applied, must be kept continually near it; and when the mixture does not produce any more elastic fluid, or the operation is required to be intermittent, care should be taken to remove the extremity of the bent tube from the water first, and then to take off the flame of the candle from under the bottle; otherwise, if the flame of the candle be first removed, the materials within the bottle condensing by cold, the water immediately enters, which in an instant fills the bottle, and generally breaks it.
that animals will not live longer in a quantity of dephlogisticated air when it stands in contact with lime-
water, than they will when no lime-water is used.

In what manner a difference so enormous can take
place, between philosophers in other respects so accu-
rate, we can by no means determine. It is plain,
however, that if 27,000 inches of common air are ne-
cessary for a person in one hour, the same quantity of
dephlogisticated air cannot be breathed longer than
four hours, nor even for a single hour.

Mr Cavallo indeed allows only 12,000 inches for four
hours; but though this might no doubt sustain life for
that time, the person must at best expect nothing from
it superior to the common atmosphere, if he was not
materially injured by it.

A very ready method of procuring dephlogisticated air
in large quantity, is by means of nitre; and on the sup-
position that 12,000 inches are sufficient for four hours,
(or for 40 hours, as he limits the Abbé Pontana's suppo-
sition), Mr Cavallo proceeds in the following manner:

"The instruments necessary for the production of
dephlogisticated air from nitre are the following; viz.
earth retorts, or earthen vessels with a straight neck,
several in the shape of Florence flasks, but with a
longer neck, these being cheaper than the retorts; and
answering as well, viz. a small furnace, in which the
earthen retort must be kept red-hot; a common
chimney fire is not sufficient. These furnaces may be
very easily made out of large black lead crucibles.
The nitre must be put into the retort or other vessel,
so as to fill half or nearly three quarters of its belly;
then a bent glass tube is luted to the neck of the ear-
then vessel, in such a manner as not to let any elastic
fluid escape into the open air. The bent tube or ce-
ment for this or similar purposes is made by mixing to-
gether whitening and drying oil. The retort being put
into the furnace, must be surrounded with lighted
charcoal, which is to be supplied according as it wa-
tes; in short, the belly of the retort must be kept quite
red-hot, or rather white-hot, for about three hours at
least. If, instead of the retort, the other described
earthen vessel be used, care should be had to place it
with the neck as little inclined to the horizon as pos-
fible, lest the nitre should drop the neck and break it."
The air is then to be received into large glass jars, as
is usual in other experiments on air.

"The retort or other earthen vessel that is used for
this purpose cannot serve for more than once, because
it generally breaks in cooling; and besides, the de-
composed nitre cannot easily be taken out of it. The
retort capable of holding a pound of nitre (the quan-
tity necessary for producing 12,000 cubic inches of
dephlogisticated air) for this operation, costs at least
half-a-crown; the other earthen vessels in the shape of
Florence flasks, but with longer necks, cost about
1s. 6d. a-piece, or 2s.; so that the price of these ve-

sels far exceeds the usual price of the apparatus. If
such vessels are employed, the nitre will not yield near
as much air, though of a purer sort, because the glass
vessels cannot endure such a great fire as the earthen
ones. The retorts of metal, or at least of those metals
which are most usually employed for this purpose, viz.
iron, copper, plughisticate in a great measure the
air as soon as produced. Considering, then, all these
circumstances, it appears, that when a person has all the
usual apparatus and furnace, the expenses at present
of Artifi-
cial Airs.

of Artificial Airs.

Sec. XIV.

Another method of preparing dephlogisticated air
is, by blowing that of the common atmosphere thro'
melted nitre. In this process the phlogiston contained
in the atmosphere is gradually consumed, by detoning
with the acid of the nitre, and therefore issues much
more pure than before. This method has the appear-
ance at first of being much easier and more commodious
than the former; but as it is impossible to mix the
atmospheric air exactly with the melted nitre that every
particle of the one may come in contact with every
particle of the other, it is plain that the former me-

thod must be preferable; not to mention that it will
be found exceedingly troublesome to blow the air
through the nitre, as the latter will be perpetually apt
to cool and concret into lumps by the cold blast.

§ 5. To procure Vitriolic Acid Air.—This consists of
the vitriolic acid united with some phlogiston, which vo-
latilizes and renders it capable of assuming the form of
a permanently elastic fluid. To obtain it, some strong
concentrated vitriolic acid must be put into the usual
bottle, together with some substance capable of fur-

nishing phlogiston. Olive oil answers very well. The
oil of vitriol should be about three or four times as
much as the sweet oil, and both together should fill
about one-third or half the bottle. A gentle degree of
heat is then required, in order to let these materials
yield any elastic fluid; which may be done by apply-
ing the flame of a wax taper, as directed above for the
production of dephlogisticated air.

§ 6. To procure Marine Acid Air, which is no oth-
er than the marine acid itself, and which without any
addition becomes a permanently elastic fluid; put some
sea-felt, or common kitchen felt, into the usual bottle
in which the materials for producing elastic fluids are
generally put, fo as to fill about a fourth part of it;
and upon this felt pour a small quantity of good con-
centrated vitriolic acid; then apply the bent tube to
the bottle, and introduce it through the quicksilver
into the receiver, filled with and inverted in quicksilver
after the usual method, and the elastic fluid is copi-
ously produced.

§ 7. To procure Nitrous Acid Air.—This may be ob-
ained from heated nitrous acid, the vapour of which
acquires a permanent elasticity, and it has been found
to remain uncondensed into a visible fluid by any cold
to which it has been hitherto exposed. The great dif-
ficulty is to find a fluid capable of confining this acid
air; because it is easily and abundantly absorbed by
water, which is one of its properties by which it differs
from nitrous air. It acts upon quicksilver, and also on
oils; hence its examination cannot be made very
imperfectly; for substances must be exposed to it,
or mixing with it, whilst it is actually changing its
nature by acting on the mercury or other fluid that con-

fines it.

When water has absorbed a good quantity of this
elastic fluid, it acquires the properties of nitrous acid;
and when heated, it yields a large quantity of nitrous
AEROLOGY.

Of Artificial Air.

Air, viz. a quantity many times greater than that which water is wont to imbibe of it by agitation, or by any known means.

When the nitrous acid air is combined with essential oils, a considerable effervescence and heat are produced, nearly in the same manner as when the nitrous acid itself is poured upon those oils.

§ 8. Fluor Acid Air.—Put some of those minerals called flours, or fusible flars, pulverized into the usual bottle, and upon it pour some concentrated oil of vitriol; then adapt the bent tube, &c. The fluor acid air is at first produced without the help of heat; but in a short time it will be necessary to apply the flame of a candle to the bottle, by which means a considerable quantity of this elastic fluid is obtained.

§ 9. Alkaline Air.—Let the usual bottle be about half filled with volatile spirit of sal ammoniac; and after applying the bent tube, &c. let the flame of a candle be brought under the bottle, by which means the alkaline air will be produced copiously.

Hepatic Air. See Sect. XI. supra.
A P E R O N  O Y .

Fermentation: Why it will not go on in vacuo, 12.
Fermented liquor restored from a vapid state by adding fixed air to them, 180.
Finery-cinder, the fame with scales of iron, consists of the metal united with dephlogificated air, 124.
Fire supposed to be the cause of the air's elasticitvf, 11.
Fixed air contained in abor­ bent earths and alkaline salts, 21.
Its proportion in these substances, 22. Effervescence of these substances with acids occasioned by fixed air, 21. Increase the weight of metallic precipitates, 21. Sup­ posed to be the principal of union in terrestrial bodies, 11.
Fixes supposition, 7. Aire, and putrifying the air's quality, 122. Forms by the union of phlogiston with dephlogificated air, 67. Found in a great variety of substances, 106. Specific gravity, and other properties of this kind of air, 107. 108.
Its constituent principles, 109.
Dr Prieſfley's experiments on its composition, 110.
Fontana, Abbe: Effects of his breathing inflammable air, 141.
French philosophers, their ex­ periments on the composition of water, 82.
Fur of a ‧ussian hare produces dephlogificated air with water, 45.
Gold: A peculiar kind of air produced from its solution, 175. A beautiful experiment with it, 186. Green matter observed by Dr Prieſfley in glass jars producing dephlogificated air, proved to be of an animal nature, 40.

F H

Hales, Dr, his discoveries, 18.
Heat: Its effects on fixed air, 115.
Hepatic air, produced from an ore of zinc, 176. Effi obtained from liver of sulphur, 177. Its properties, 109.
Hot Chalices: Great quantity of inflammable air produced in them, 118.
Human hair produces dephlogificated air with water, 45.
I

I see dissolved very fast by alkaline air, 146. And by ma­ rine acid air, 171.
Incondensible vapors arising from water, 86. Prieffley's conjectures concerning it, 87.
Attempts to collect it, 88.
Inflammable air: Method of burning it in the dephlogificated kind, 59. Water produced from a mixture of inflammable and dephlogificated air, 77. Quantity of it necessary to phlogificated common air, 78. This kind of air produced in mines, from putrid waters, &c. It has been generated in hot climates, 118. Mr Ca­ vallo's method of collecting it from ponds, 119. Me­ teors thought to be produced by it 120.
Different kinds of inflammable air, 121. Extracted from various substances by heat, 122.
More air procured by a sudden and violent than by a gradual heat, 123. How procured from water and other fluid and solid substances, 124.
Proportions of inflammable air procured from iron by means of steam, 125. Of the constituent parts of in­ flammable air, 126. No acid contained in it, 127.
Water necessary to its production according to Dr Prie­ fley, 128. Denied by Mr Kir­ wan, 128. Charcoal totally convertible into it, 129. Ex­ periment showing the necessi­

A J

A difficult of dephlogificated air, 26. Effects of light without heat, 43. Of artificial light, 44.
Lent produces dephlogificated air, 45.
Linnus, its solution decom­ posed by taking the elec­ tric spark in dephlogificated air confined over it, 105.
Liver of sulphur absorbs dephlogificated air, 95. Yields hepatic air in plenty, 177.
M.

Mangaefe: Sulphurated in­ flammable air first produced from it, 144.
Marble, why it sometimes bursts with froth, 5.
Marine Acid Air, how pro­ cessed, 170. Its properties, 171.
Changed into inflammable air, 172.
Mediterranean Sea: Quantity of water evaporated from its surface, 41.
Metallic vapors, their poison­ ous qualities, 5.
 Metallic calces, their poisonous qualities, 5.
 Metallic calces, their poisonous qualities, 5.
 Mercury yields dephlogificated air either with nitrous or vitriolic acid, 31.
Mineral waters contain air, 19, 20.
Mint restores noxious air to a state of falsabity by its vege­ tation, 32, 33.
Moxies, their nature, 5.
Moxies, its effects on air, 35.
N.

Nitre yields a great quantity of dephlogificated air, 28.
Nitrour acid diminishes dephlo­ gificated air, 60, 134. Yields nitrous acid when decomposed, 76. How procured, 135.
Nitrous acid, whether or not it enters the composition of nitrous air, 66. Produced from dephlogificated and inflammable air, 77.
Nitrous acid air, how procured, 166. Cannot be pre­

K
INDEX.

AEROMANCY, a species of divination performed by means of air, wind, &c. See DIVINATION, No. 5.

AEROMETRY, the science of measuring the air. It comprehends not only the doctrine of the air itself, confidered as a fluid body; but also its preffure, efflance, rarefaction, and condensation. But the term is at present not much in ufe, this branch of natural philosophy being more frequently called Pneumatics. See PNEUMATICS.

AERONAUT, a person who attends and guides an air-balloon. See AEROSTATION and AIR-BALLOON.

AERONAUTICA, from ÅN and AVIUS, derived from SAE, ship; the art of falling in a vesfl or machine through the atmosphere, sustained as a ship in the sea. Aerophylacea.

AERONYMPHA, from ÅR and NYMPH, a water nymph. See AEROSTATION.

AEROPHYTE, a term used by naturalists for caverns or referrers of air, supposed to exist in the bowels of the earth. Kircher speaks much of aerophylacea, or huge caverns, replete with air, disposed under ground; from whence, through numerous occult passages, that element is conveyed either to subterraneous receptacles of water, which, according to Kircher, are hereby raised into springs or rivers, or into the funds of subterraneous fire, which are hereby fed and kept alive for the preparation of metals, minerals, and the like.
AEROSTATION

Is a science newly introduced into the Encyclopædia. The word, in its primitive sense, denotes the science of insinuating weights in the air; but in its modern acceptance, it signifies aerial navigation, or the art of navigating through the atmosphere. Hence also the machines which are employed for this purpose are called aerostats, or aerostatic machines; and from their globular shape, air-ballons.

The romances of almost every nation have recorded instances of persons being carried through the air, both by the agency of spirits and by mechanical inventions; but till the time of the celebrated Lord Bacon, no rational principle appears to have been thought of by which this might be accomplished. Before that time, indeed, Friar Bacon had written upon the subject; and many had been of opinion, that, by means of artificial wings, fixed to the arms or legs, a man might fly as well as a bird; but these opinions were thoroughly refuted by Borelli in his treatise De Motu Animalium, where, from a comparison between the power of the nkeles which move the wings of a bird, and those which move the arms of a man, he demonstrates that the latter are utterly insufficient to strike the air with such force as to raise him from the ground. It cannot be denied, however, that wings of this kind, if properly constructed, and dexterously managed, might be sufficient to break the fall of a human body from an high place, so that some adventurers in this way might possibly come off with safety; though by far the greatest number of those who have rashly adopted such schemes, have either lost their lives or limbs in the attempt.

In the year 1672, Bishop Wilkins published a treatise, intitled, the Discovery of the New World; in which he mentions, though in a very indistinct and confused manner, the true principle on which the air is navigable; quoting, from Albertus de Saxonia and Francis Mendoca, *that the air is in some part of it navigable: and upon this static principle, any brass or iron vessel (suppose a kettle), whose sub stance is much lighter than that of water, yet being filled with the common air, it will swim upon it and not sink. So suppose a cup or wooden vessel upon the outward borders of this elementary air, the capacity of it being filled with fire, or rather ethereal air, it must necessarily, upon the same ground, remain swimming there, and of itself can no more fall than an empty ship can sink.* This idea, however, he did not by any means pursue, but relit his hopes entirely upon mechanical motions, to be accomplished by the mere strength of a man, or by springs, &c. and which have been demonstrated incapable of answering any useful purpose.

The only person who brought his scheme of flying to any kind of rational principle was the Jesuit Francis Lana, contemporary with Bishop Wilkins. He, being acquainted with the real weight of the atmosphere, justly concluded, that if a globular vessel were exhausted of air, it would weigh less than before; and con sidering that the solid contents of vessels increase in much greater proportion than their surfaces; he supposed that a metallic vessel might be made so large, that, when emptied of its air, it would be able not only to raise itself in the atmosphere, but to carry up passengers along with it; and he made a number of calculations necessary for putting the project in execution. But though the theory was here unexceptionable, the means proposed were certainly insufficient to accomplish the end: for a vessel of copper, made so thin as was necessary to make it float in the atmosphere, would be utterly unable to resist the external pressure; which being demonstrated by those skilled in mechanics, no attempt was made on that principle.

In the year 1709, however, as we were informed by Strange, a letter published in France in 1708, a Portuguese projector, Friar Guzman, applied to the king for encouragement to his invention of a flying machine. The principle on which this was constructed, if indeed it had any principle, seems to have been that of the paper kite. The machine was constructed in form of a bird, and contained several tubes through which the wind was to pass, in order to fill a kind of sails, which were to elevate it; and when the wind was deficient, the same effect was to be performed by means of bellows concealed within the body of the machine. The ascent was also to be promoted by the electric attraction of pieces of amber placed in the top, and by two spheres inclining magnets in the same situation.

These childish inventions show the low state of science at that time in Portugal, especially as the king, in order to encourage him to farther exertions in such an useful invention, granted him the first vacant place in his college of Barcelos or Santarem, with the first professorship in the University of Coimbra, and an annual pension of 600,000 reis during his life. Of this De Guzman, it is also related, that in the year 1736, he made a贝壳 basket of about seven or eight feet diameter, and covered with paper, which raised itself about 200 feet in the air, and the effect was generally attributed to witchcraft.

In the year 1766, Mr Henry Cavendish ascertained the weight and other properties of inflammable air, determining it to be at least seven times lighter than common air. Soon after which, it occurred to Dr Black, that perhaps a thin bag filled with inflammable air might be buoyed up by the common atmosphere: and he thought of having the allantois of a calf prepared for this purpose; but his other avocations prevented him from prosecuting the experiment. The same thought occurred some years afterwards to Mr Cavalllo; and he has the honour of being the first who made experiments on the subject. He first tried bladders; but the thinnest of these, however well scaped and prepared, were found too heavy. He then tried Chinese paper; but that proved so permeable, that the vapour passed through it like water through a sieve. His experiments, therefore, made in the year 1782, proceeded...
Aerostation discovered by Montgolfier.

But while the discovery of the art of aerostation seemed thus on the point of being made in Britain, it was all at once announced in France, and that from a quarter whence nothing of the kind was to have been expected. Two brothers, Stephen and John Montgolfier, natives of Annonay, and masters of a considerable paper manufactorythere, had turned their thoughts towards this project as early as the middle of the year 1782. The idea was first suggested by the natural ascent of the smoke and clouds in the atmosphere; and their design was to form an artificial cloud, by inclosing the smoke in a bag, and making it carry up the covering along with it. Towards the middle of November that year, the experiment was made at Avignon with a fine silk bag of a parallelopiped shape. In applying burning paper to the lower aperture, the air was rarefied, and the bag ascended in the atmosphere, and struck rapidly against the ceiling. On repeating the experiment in the open air, it rose to the height of about 70 feet.

An experiment on a more enlarged scale was now projected; and a new machine, containing about 650 cubic feet, was made, which broke the cords that confined it, and rose to the height of about 600 feet. Another of 35 feet in diameter rose about 1000 feet high, and fell to the ground three quarters of a mile from the place where it ascended. A public exhibition was next made on the fifth of June 1783, at Annonay, where a vast number of spectators assembled. An immense bag of linen, lined with paper, and containing upwards of 23,000 cubic feet, was found to have a power of lifting about 500 pounds, including its own weight. The operation was begun by burning chopped straw and wood under the aperture of the machine, which immediately began to swell; and after being set at liberty, ascended into the atmosphere. In ten minutes it had ascended 6000 feet; and when its force was exhausted, it fell to the ground at the distance of 7600 feet from the place whence it set out.

Soon after this, one of the brothers arrived at Paris, where he was invited by the Academy of Sciences to repeat his experiments at their expense. In consequence of this invitation, he constructed, in a garden in the Faubourg of St Germain, a large balloon of an elliptical form. In a preliminary experiment, this machine lifted up from the ground eight persons who held it, and would have carried them all off if more had not quickly come to their assistance. Next day the experiment was repeated in presence of the members of the academy; the machine was filled by the combustion of 50 pounds of straw made up in small bundles, upon which about 12 pounds of chopped wool were thrown at intervals. The usual success attended this exhibition: the machine soon swelled; endeavoured to ascend; and immediately after suf­fused itself in the air, together with the charge of between 4 and 500 pounds weight. It was evident that it would have ascended to a greater height; but as it was designed to all at once announce before the king and royal family at Versailles, the cords by which it was tied down was not cut. But in consequence of a violent rain and wind which happened at this time, the machine was

Some animals such as a cock, a duck, a sheep, a duck, were the first animals ever sent through the air.

In a preliminary experiment, this number of letters was thrown up; and immediately after this, one of the brothers arrived at Paris, where a great number of persons who held it, ascended about 500 pounds weight. It was next made on the fifth of June, at Annonay, where a vast number of spectators assembled. An immense bag of linen, lined with paper, and containing upwards of 23,000 cubic feet, was found to have a power of lifting about 500 pounds, including its own weight. The operation was begun by burning chopped straw and wood under the aperture of the machine, which immediately began to swell; and after being set at liberty, ascended into the atmosphere. In ten minutes it had ascended 6000 feet; and when its force was exhausted, it fell to the ground at the distance of 7600 feet from the place whence it set out.

account of his expériments.

The height of the whole apparatus was upwards of 1600 pounds. The experiment was performed on the 15th of October 1783. Mr Pilatre de Rozier offered himself to be the first aerial adventurer.

This new machine was constructed in a garden in the Faubourg of St Antoine. It was of an oval shape, about 48 feet in diameter and 74 in height; elegantly painted on the outside with the insign of the zodiac, circles of the king's name, and other ornaments. A proper gallery, stage, &c., were appended in the manner afterwards described; so that it was easy for the person who ascended to supply the fire with fuel, and thus keep up the machine as long as he pleased. The weight of the whole apparatus was upwards of 1600 pounds. The experiment was performed on the 15th of October 1783. Mr Pilatre having placed himself in the gallery, the machine was inflated, and permit­ted to ascend to the height of 84 feet, where he kept it aloft about for four minutes and a half; after which it descended very gently; and the wind had a tendency to ascend, that it rebounded to a considerable height after touching the ground. Two days after, he repeated the experiment with the same success as before; but the wind being strong, the machine did not sustain itself so well as formerly. On repeating the experiment in calmer weather, he ascended to the height of 210 feet. His next ascent was 262 feet; and in the descent, a gust of wind having blown the machine over some large trees of an adjoining garden, Mr Pilatre suddenly extricated himself from dangerous a situation, by throwing some straw and chopped wool on the fire, which raised him at once to a sufficient height. On descending again, he once more raised himself to a proper height by throwing straw on the fire. Some time after, he ascended in company with Mr Girond de Villette to the height of 330 feet; hovering over Paris at least nine minutes in sight of all the inhabitants, and the machine keeping all the while perfectly steady.

Thee experiments had shown, that the aerostatic machines might be raised or lowered at the pleasure of the
the persons who ascended: they had likewise discovered, that the keeping them fast with ropes was no advantage; but, on the contrary, that this was attended with inconvenience and hazard. On the 21st of November 1783, therefore, M. Pilâtre determined to undertake an aerial voyage in which the machine should be fully set at liberty. Every thing being got in readiness, the balloon was filled in a few minutes: and M. Pilâtre placed himself in the gallery, counterpoised by the Marquis d’Arlanc, who occupied the other side. It was intended to make some preliminary experiments on the ascending power of the machine: but the violence of the wind prevented this from being done, and even damaged the balloon essentially: so that it would have been entirely destroyed had not timely assistance been given. The extraordinary exertions of the workmen, however, repaired it again in two hours, and the adventurers set out. They met with no inconvenience during their voyage, which lasted about 2½ hours; during which time they had passed over a space of above five miles. — From the account given by the Marquis d’Arlanc, it appears that they met with several different currents of air; the effect of which was, to give a very sensible shock to the machine, and the direction of the motion seemed to be from the upper part downwards. It appears also that they were in some danger of having the balloon burst altogether; as the Marquis observed several round holes made by the fire in the lower part of it, which alarmed him considerably, and indeed not without reason. However the progress of the fire was easily stopped by the application of a wet sponge, and all appearance of danger ceased in a very short time.

This voyage of M. Pilâtre and the Marquis d’Arlanc may be said to conclude the history of those aerostatic machines which are elevated by means of fire; for though many other attempts have been made upon the same principle, most of them have either proved unsuccessful or were of little consequence. They have therefore given place to the other kind, filled with inflammable air; which, by reason of its smaller specific gravity, is both more manageable, and capable of performing voyages of greater length, as it does not require to be supplied with fuel like the others. This was invented a very short time after the discovery had been made by M. Montgolfier. This great man indeed designed to keep his method in some degree a secret from the world; but as it could not be concealed, that a bag filled with any kind of fluid lighter than the common atmosphere would raise itself, inflammable air was naturally thought of as a proper succedanum for the rarefied air of M. Montgolfier. The first experiment was made by two brothers Meûrs Robert and Charles, with the idea of undertaking something of the same kind with a balloon filled with inflammable air. The machine used on this occasion was formed of gores of silk, covered over with a varnish made of cossethuce, of a spherical figure, and measuring 271 feet in diameter. A net was spread over the upper hemisphere, and was fastened to an hoop which passed round the middle of the balloon. To this a sort of car, or rather boat, was suspended by ropes, in such a manner as to hang a few feet below the lower part of the balloon; and, in order to prevent the bursting of the machine, a valve was placed in it; by opening of which some of the inflammable air might be occasionally let out. A long silken pipe communicated with the balloon, by means of which it was filled. The boat was made of basketh work, covered with painted linen, and beautifully ornamented; being 8 feet long, broad, and 35 deep; its weight 130 pounds. At this time, however, as at the former, they met with great difficulties in filling the machine with inflammable air, owing to their ignorance of the most proper apparatus. But at last, all obstacles being removed, the two adventurers took their seats at three quarters after one in the afternoon of the first of December 1783. Persons skilled in mathematics were conveniently stationed with proper instruments to calculate the height, velocity, &c. of the balloon. — The weight of the whole apparatus, including that of the two adventurers, was found to be 6042 pounds, and the power of ascent when they set out was 20 pounds; so that the whole difference between the weight of this balloon and an equal bulk of common air was 6244 pounds. But the weight of the common atmosphere displaced by the inflammable gas was calculated to be 771 pounds, so that there remains 147 for the weight of the latter; and this calculation makes it only 5½ times lighter than common air.

At the time the balloon left the ground, the thermometer stood at 90° of Fahrenheit’s scale, and the quicksilver, in the barometer, at 30.18 inches; and, by means

AEROSTATION. History.

First aerial voyage made by Meûrs Rozier and Arlandes, naturally Angola by M. Charles and Roberts.
means of the power of ascent with which they left the
ground, the balloon rose till the mercury fell to 27 in-
ches, from whence they calculated their height to be
about 600 yards. By throwing out ballast occasion-
ally as they found the machine descending by the ex-
te of some of the inflammable air, they found it
practicable to keep at pretty near the same distance
from the earth during the rest of their voyage; the
quicksilver fluctuating between 27 and 27.65 inches,
and the thermometer between 53° and 57°, the whole
time. They continued in the air for the space of an
hour and three quarters, when they alighted at the
distance of 27 miles from Paris; having suffered no
inconvenience during their voyage, nor experienced
any contrary currents of air, as had been felt by
Messrs Piature and Arlandes. As the balloon still
reained a great quantity of inflammable gas, Mr Charles
determined to take another voyage by himself. Mr
Robert accordingly got out of the boat, which was
thus lightened by the removal of the inflammable air,
and this remaining in the boat, which was
understood to be blown up to a height of 4000 feet;
and having a velocity of 200 feet in a minute, he
was carried up with such velocity, that in twenty minutes
he was almost 9000 feet high, and entirely out of sight of terrestrial objects. At the
moment of his parting with the ground, the globe had
been rather flaccid; but it soon began to swell, and
the inflammable air escaped from it in great quantity
through the silken tube. He also frequently drew
the valve that it might be the more freely emitted,
and the balloon effectually prevented from bursting.
The inflammable gas being considerably warmer than
the external air, diffused itself all round, and was
diffused as warm atmosphere; but in ten minutes the
thermometer indicated a variation of temperature as
great as that between the warmth of summer and the
ordinary cold of winter. His fingers were benumbed
by the cold, and he felt a violent pain in his right
ear and jaw, which he ascribed to the dilatation of
the air in these organs as well as to the external cold.
The beauty of the prospect which he now enjoyed,
however, made amends for these inconveniences.
At his departure the sun was set on the valleys; but
the height to which Mr Charles was got in the atmo-
sphere, rendered him again visible, though only for
a short time. He saw, for a few seconds vapours
rising from the valleys and rivers. The clouds
seemed to ascend from the earth, and collect one upon
the other, still preserving their usual form; only their
colour was grey and monotonous for want of sufficient
light in the atmosphere. By the light of the moon,
he perceived that the machine was turning round with
him in the air; and he observed that there were con-
tary currents which brought him back again. He ob-
erved also, with surprize, the effects of the wind, and
that the streamers of his banners pointed upwards;
which, he says, could not be the effect either of his
descend or ascent; for he was moving horizontally at the
time. He, therefore, recollecting his promise of returning
to his friends in half an hour, he pulled the valve, and
accelerated his descent. When within 200 feet of the
earth, he threw out two or three pounds of ballast,
which rendered the balloon again stationary; but, in a
little time afterwards, he gently alighted in a field a
about three miles distant from the place whence he set
out; though, by making allowance for all the turn-
ings and windings of the voyage, he supposes that he
had gone through nine miles in all. By the calcula-
tions of M. de Manlier, he rose at this time not less
than 10,500 feet high; a height somewhat greater
than that of Mount Ararat. A small balloon, which
had been sent off before the two brothers set out on
their voyage, took a direction opposite to that of the
large one, having met with an opposite current of air,
probably at a much greater height.
The subsequent aerial voyages differ so little from
that just now related, that any particular description
of them seems to be superfluous. It had occurred to Mr
Charles, however, in his last flight, that there might be
a possibility of directing the machine in the atmosphere,
and this was soon attempted by Mr Jean-Pierre Blan-
chard, a gentleman who had, for several years before,
amused himself with endeavours to fly by mechanical
means, though he had never succeeded in the under-
taking. As soon as the discovery of the aeroftatic ma-
cines was announced, however, he resolved to add the
wings of his former machine to a balloon, and made no
doubt that it would then be in his power to direct him-
sely through the air at pleasure. In his first flight
he was disappointed at the impetuosity of a young gentle-
man, who insinuated, right or wrong, on ascending along
with him. In the feuffle which ensued on this occa-
sion, the wings and other apparatus were entirely de-
stroyed; so that Mr Blanchard was obliged to commit
himself to the direction of the wind; and in another
attempt it was found, that all the strength he could ap-
cly to the wings was scarce sufficient to counteract the
impression of the wind in any degree. In his voyage,
he found his balloon, at a certain period, acted upon
by two contrary winds; but, on throwing out four
pounds of ballast, he ascended to a place where he met
with the same current he had at leaving out from the
earth. His account of the sensations he felt during
this voyage, was somewhat different from that of Mr
Charles; having, in one part of it, found the atmos-
phere very warm, in another cold; and having once
found himself very hungry, and at another time almost
overcome by a propensity to sleep. The height
to which he rose, as measured by several observations with
mathematical instruments, was thought to be very little
less than 20,000 feet; and he remained in the atmo-
sphere an hour and a quarter.
The attempts of Mr Blanchard to direct his machine
Voyage of through the atmosphere, were repeated in the month
of April 1784, by Meffrs Morveau and Bertrand, at
Dijon, who raised themselves with an inflammable air
balloon to the height, as it was thought, of 13,000 feet;
passing through a space of 18 miles in an hour and 25
minutes. Mr Morveau had prepared a kind of oars
for directing the machine through the air; but they
were damaged by a gust of wind, so that only two of
them remained serviceable; by working these, how-
ever, they were able to produce a sensible effect on the
motion of the machine. In a third aerial voyage per-
fomed by Mr Blanchard, he seemed to produce some
effects by the agitation of his wings, both in ascending,
descending, moving forward, and even in some mea-
sure against the wind; however, this is vaspoled, with
some probability, to have been a mistake, as, in all his
succeeding voyages, the effects of his machinery could
not be perceived.
The experiment of Melleurs Charles and Robert in their former experiments, encouraged them to repeat them, with the addition of some machinery to direct their course. Having enlarged their former balloon to the size of an oblong spheroid 464 feet long and 27 feet in diameter, they made it to float with its longest part parallel to the horizon. The wings were made in the shape of an umbrella without the handle, to the top of which a stick was fastened parallel to the aperture of the umbrella. Five of these were disposed round the boat, which was near 17 feet in length. The balloon was filled in 2 hours, and, with the addition of 450 pounds of ballast, remained in equilibrium with the atmosphere. About noon, on the 19th of September, they began to ascend very gently in consequence of throwing out 24 pounds of ballast, but were soon obliged to throw out eight pounds more in order to avoid running against some trees. Thus they rose to the height of 1400 feet, when they perceived some thunder-clouds near the horizon. On this they ascended and descended, to avoid the danger, as the wind blew directly towards the threatening clouds; but, from the height of 600 feet to that of 4200 above the surface of the earth, the current was quite uniform and in one direction. During their voyage they lost one of their oars; but, found, that by means of those which remained, they considerably accelerated their course. From the account of their voyage, it would seem that they had passed safely through the thunder-clouds; as we are informed, that, about 40 minutes after three, they heard a loud clap of thunder; and, three minutes after, another much louder; at which time the thermometer sunk from 77 to 59 degrees. This sudden cold, occasioned by the approach of the clouds, condensed the inflammable air so that the balloon descended very low, and they were obliged to throw out 40 pounds of ballast; yet on examining the heat of the air within the balloon, they found it to be 104°, when that of the external atmosphere was only 63. When they had got so high that the mercury in the barometer stood only at 23 inches, they found themselves becalmed; so that the machine did not go even at the rate of two miles an hour; and, for an hour and a quarter, it seemed to be at rest. At length the wind was strong enough to make them advance, and they continued moving in a straight line at the rate of 24 miles an hour. They had then ascended 6000 feet. After having travelled about 150 miles, they descended, only on account of the approach of night, having still 200 pounds of ballast left.

Their conclusion, with regard to the effect of their wings, is as follows: "Those experiments show that far from going against the wind, as is said by some persons to be possible in a certain manner, and some aeronauts pretend to have actually done, we only obtained, by means of two oars, a deviation of 22 degrees: it is certain, however, that if we could have used our four oars, we might have deviated about 40 degrees from the direction of the wind, and as our machine would have been capable of carrying seven persons, it would have been easy for five persons to have gone, and to have put in action eight oars, by means of which a deviation of about 80 degrees would have been obtained.

"We had already observed (say they), that if we did not deviate more than 22 degrees, it was because the wind carried us at the rate of 24 miles an hour; and it is natural to judge, that, if the wind had been twice as strong as it was, we should not have deviated more than one-half of what we actually did; and, on the contrary, if the wind had been only half as strong, our deviation would have been proportionally greater."

Having thus related all that has been done with regard to the conducting of aerostatic machines through the atmosphere, we shall now relate the attempts that have been made to lessen their expense, by falling upon some contrivance to ascend without throwing out ballast, and to descend without losing any of the inflammable air. The first attempt of this kind was made by the Duke de Chartres; who, on the 15th of July, ascended with the two brothers, Charles and Robert, from the Park of St Cloud. The balloon was of an oblong form, made to ascend with its longest diameter horizontally, and measured 53 feet in length and 24 in breadth. It contained within it a smaller balloon filled with common air; by blowing into which with a pair of bellows, and thus throwing in a considerable quantity of common air, it was supposed that the machine would become sufficiently heavy to descend, especially as, by the inflation of the internal bag, the inflammable air in the external one would be condensed into a smaller space, and thus become specifically heavier. The power of ascent with which they fell out, seems to have been very great; as, in three minutes after parting with the ground, they were lost in the clouds, and involved in such a dense vapour that they could see neither the sky nor the earth. In this situation they seemed to be attacked by a whirlwind, which, besides turning the balloon three times round from right to left, shook, and beat it so about, that they were rendered incapable of using any of the means proposed for directing their course, and the thick stuff of which the helm had been compos'd was even torn away. No scene can be conceived more terrible than that in which they were now involved. An immense ocean of shapeless clouds rolled one upon another below them, and seemed to prevent any return to the earth, which still continued invisible, while the agitation of the balloon became greater every moment. In this extremity they cut the cords which held the interior balloon, and of consequence it fell down upon the aperture of the tube that came from the large balloon into the boat, and stopped it up. They were then driven upwards by a gust of wind from below, which carried them to the top of the stormy vapour in which they had been involved. They now saw the fun without a cloud; but the heat of his rays, with the diminished density of the atmosphere, had such an effect on the inflammable air, that the balloon became every moment ready to burst. To prevent this they introduced a stick through the tube, in order to push away the inner balloon from its aperture; but the expansion of the inflammable air pushed it so close, that
AEROSTATION.

History.

All attempts of this kind proved ineffectual. It was now, however, become absolutely necessary to give vent to a very considerable quantity of the inflammable air; for which purpose the Duke de Chartres himself bored two holes in the balloon, which tore open for the length of seven or eight feet. On this they descended with great rapidity; and would have fallen into a lake, had they not hastily thrown out 60 pounds of ballast, which enabled them just to reach the water's edge.

The success of the scheme for raising or lowering aerostatic machines by means of bags filled with common air being thus rendered dubious, another method was thought of. This was to put a small aerostatic machine with rarefied air under an inflammable air-balloon, but at such a distance that the inflammable air of the latter might be perfectly out of the reach of the fire used for inflating the former; and thus, by increasing or diminishing the fire in the small machine, the absolute weight of the whole would be considered as diminished or augmented. This scheme was unhappily put in execution by the celebrated Mr Pilatre de Rozier, and another gentleman named Mr Romaine. Their inflammable-air balloon was about 37 feet in diameter, and the power of the rarefied-air one was equivalent to about 60 pounds. They ascended without any appearance of danger or finer accident, but had not been long in the atmosphere when the inflammable-air balloon was seen to swell very considerably, at the same time that the aeronauts were seen to be confined in the balloon, very anxious to get down, and with great rapidity. There seemed to have been dead before he came to the ground; but Mr Romaine was alive when some persons coming up to the place were he lay, though he expired immediately after.

There are the most remarkable attempts that have been made to improve the science of aërostation; tho' a great number of other expeditions through the atmosphere have taken place. But of all the voyages which had been hitherto projected or put in execution, the most daring was that of Mr Blanchard and Dr Jeffries across the Straits of Dover which separate Britain from France. This took place on the 7th of January 1785, being a clear frothy morning, with a wind, barely perceptible, at N. W. The operation of filling the balloon began at 10 o'clock, and, at three quarters after twelve, every thing was ready for their departure. At one o'clock Mr Blanchard defied the boat to be pulled off, which now stood only two feet distant from that precipice finely described by Shakespeare in his tragedy of King Lear. As the balloon was scarcely sufficient to carry two, they were obliged to throw out all their ballast except three bags of ten pounds each; when they at last rose gently, though making very little way on account of there being so little wind. At a quarter after one o'clock, the barometer, which on the cliff stood at 29.7 inches, was now fallen to 27.3, and the weather proved fine and warm. They had now a most beautiful prospect of the south coast of England, and were able to count 37 villages upon it. After passing over several vessels, they found that the balloon, at 30 minutes after one, was descending, on which they threw out a flock and half of ballast; but as they saw that it still descended, and that with much greater velocity than before, they now threw out all the ballast. This still proving ineffectual, they next threw out a parcel of books they carried along with them, which made the balloon ascend, when they were about midway between France and England. At a quarter past two, finding themselves again descending, they threw away the remainder of their books, and, ten minutes after, they had a most enchanting prospect of the French coast.

Still, however, the machine descended; and as they had now no more ballast, they were fain to throw away their provisions for eating, the wings of their boat, and every other moveable they could easily spare. "We threw away, says Dr Jeffries, our only bottle, which, in its descent, cast out a jet like smoke, with a rushing noise; and when it struck the water, we heard and felt the shock very perceptibly on our car and balloon." All this proving insufficient to stop the descent of the balloon, they next threw out their anchors and cords, and at last stripped off their clothes,fastening themselves to certain firings, and intending to cut away the boat as their last resource. They had now the satisfaction, however, to find that they were rising; and as they passed over the high lands between Cape Blanc and Calais, the machine rose very fast, and carried them to a greater height than they had been at any former part of their voyage. They descended safely among some trees in the forest of Guiness, where there was just opening enough to admit them.

It would be tedious as well as unnecessary to recount all the other aerial voyages that have been performed in different parts of Europe: It appeared sufficient for the purpose of this article to notice those which were most remarkable and interesting; and therefore an account of the ingenious Mr Baldwin's excursion from Chester, alluded to above, shall now close our enumeration.

On the 8th of September 1783, at forty minutes past one P. M. Mr Baldwin ascended from Chester in Mr Lunardi's (a) balloon. After traversing in a variety of different directions, he first alighted, at 28 minutes after three, about 12 miles from Chester, in the neighborhood of Frodham; then reascending and pursuing his excursion, he finally landed at Rixton moss, five miles N. N. E. of Wavington, and 25 miles from Chester. Mr Baldwin has published his Observations and Remarks made during his voyage, and taken from minutes. Our limits will not admit of relating many accounts of this gentleman's adventurous excursions have been published in all the Newspapers, and therefore it appeared unnecessary to take up room with an account of them in this article.

(a)
many of his observations; but the few following are some of the most important and curious. "The sensation of ascending is compared to that of a strong pressure from the bottom of the car upwards against the soles of his feet. At the distance of what appeared to him seven miles from the earth, though by the barometer scarcely a mile and a half, he had a grand and most enchanting view of the city of Chester and its adjacent places below. The river Dee appeared of a red colour; the city very diminutive; and the town entirely blue. The whole appeared a perfect plain, the highest building having no apparent height, but reduced all to the same level, and the whole terrestrial prospect appeared like a coloured map. Just after his first ascent, being in a well-watered and maritime part of the country, he observed a remarkable and regular tendency of the balloon towards the sea; but shortly after rising into another current of air, he escaped the danger: this upper current, he says, was visible to him at the time of his descent, by a lofty found stratum of clouds flying in a safe direction. The perspective appearance of things to him was very remarkable. The lowest bed of vapour that first appeared as cloud was pure white, in detached fleeces, increasing as they rose: they presently coalesced, and formed, as he expresses it, a sea of cotton, tufting here and there by the action of the air in the undisturbed part of the cloud. The whole became an extended white floor of cloud, the upper surface being smooth and even. Above this white floor he observed, at great and unequal distances, a vast assemblage of thunder-clouds, each parcel consisting of whole acres in the densest form: he compares their form and appearance to the froth of pieces of ordnance, which had conflagrated as it were into mists of snow, and penetrated thro' the upper surface or white floor of common clouds, there remaining visible and at rest. Some clouds had motions in fluid and various directions, forming an appearance truly stupendous and majestic. He endeavours to convey some idea of the effects by a figure (and from which Fig. 10 of Plate III. is copied). A circular view he had from the car of the balloon, himself being over the centre of the view, looking down on the white floor of clouds and seeing the city of Chester through an opening, which discovered the landscape below, limited by surrounding vapour, to less than two miles in diameter. The breadth of the outer margin defines his apparent height in the balloon (viz. 4 miles) above the white floor of clouds. Mr Baldwin also gives a curious description of his tracing the shadow of the balloon over tops of volumes of clouds. At first it was small, in size and shape like an egg; but soon increased to the magnitude of the fun's disc, still growing larger, and attended with a most captivating appearance of an iris encircling the whole shadow at some distance round it, the colours of which were remarkably brilliant. The regions did not feel colder, but rather warmer, than below. The fan was hottest to him when the balloon was stationary. The discharge of a cannon when the balloon was at a considerable height, was distinctly heard by the aeronaut; and a discharge from the same piece, when at the height of 50 yards, so disturbed him as to oblige him for safety to lay hold firmly of the cords of the balloon. At a considerable height he poured down a pint bottle full of water; and as the air did not oppose a resistance sufficient to break the streams into small drops, it mostly fell down in large drops. In the course of the balloon's track it was found much affected by the water (a circumstance observed in former aerial voyages). At one time the direction of the balloon kept continually over the water, going directly towards the sea, so much as to endanger the aeronaut; the mouth of the balloon was opened, and he in two minutes descended into an under current blowing from the sea: he kept descending, and landed at Pollard farm in Rimley, 12 miles from Chester. Here he lightened his car by 31 pounds, and instantly reascending was carried into the interior part of the country, performing a number of different manoeuvres. At his greatest altitude he found his respiration free and easy. Several bladders which he had along with him crackled and expanded very considerably. Clouds and land, as before, appeared on the same level. By way of experiment, he tried the upper valve two or three times, the neck of the balloon being closed; and remarked, that the escape of the gas was attended with a growing noise like tumults, but not near so loud. Again, round the shadow of the balloon, on the clouds, he observed the iris. A variety of other circumstances and appearances he met with, is fancifully described; and at 53 minutes past three he finally landed.

The frequency of aerial voyages, accompanied with particular details of trilling and uninteresting circumstances, and apparently made with a view to promote the interest of particular persons, regardless of any advancement in knowledge, have now sunk the science of aëration so low in the opinion of most people, that that before giving any account of the most proper method of constructing these machines, it may seem necessary to premise something concerning the uses to which they may possibly be applied. These according to Mr Cavallo are the following.

1. The small balloons, especially those made of paper, served to precipitate the condensation of clouds, by means of smoke. (the paper, when wet, expanded very considerably.) A review of their appearance in various circumstances, in which they did not mean can be used; and letters or other small things may be easily sent by them, as for instance from ships on the sea, to places in the interior, from islands, or the like. The larger aerostatic machines may answer all the above-mentioned purpooses in a better manner; and they may, besides, be used as a help to a person who wants to ascend a mountain, a precipice, or to cross a river; and perhaps one of these machines tied to a boat by a long rope, may be in some cases, a better boat of safety than any that is used at present. The largest fort of machines, which can take up one or more men, may evidently be subservient to various economical and philosophical purpooses. Their conveying people from one place to place with great swiftness, and without trouble, may be of essential use, even if the art of guiding them in a different direction from that of the wind should never be discovered. By means of those machines the shape of certain seas and lands may be better ascertained: men may ascend to the tops of mountains they never visited before; they may be carried over marshes, and
Principles.

A E R O S T A T I O N.

...and dangerous grounds; they may by that means come out of a betted place, or an island; and they may, in hot climates, ascend to a cold region of the atmosphere, either to refresh themselves, or to observe the ice which is never seen below; and, in short, they may be thus taken to several places, to which human art hitherto knew of no conveyance.

"The philosophical uses, to which these machines may be subordinated, are numerous indeed; and it may be sufficient to say, that hardly any thing which passes in the atmosphere is known with precision, and that principally for want of a method of ascending into it. The formation of rain, of thunder-forms, of vapours, hail, snow, and meteors in general, require to be attentively examined and ascertained. The action of the barometer, the rarefaction and temperature of the air in various regions, the descent of bodies, the propagation both will ascend, and for the same reason. A have they any of the sicknesses which are prevalent in the atmosphere, cannot be exceeded. No one has felt the least of that giddiness consequent upon looking from, the top of a very high building or of a precipice, nor have they any of the sicknesses arising from the motion of a vessel at sea. Many have been carried by balloons at the rate of 30, 40, or even 50 miles an hour, without feeling the least inconvenience, or even agitation of the wind; the reason of which is, that as the machine moves with the nearly the velocity of the wind itself, they are always in a calm, and without uneasiness. Some have apprehended danger from the electricity of the atmosphere; and have thought that a stroke of lightning, or the smallest electric spark, happening near a balloon, might set fire to the inflammable air, and destroy both the machine and the adventurers. Mr. Cavallo has suggested several considerations for diminishing apprehensions of this kind. Balloons have been already raised in every season of the year, and even when thunder has been heard, without injury. In case of danger, the aeronauts may either baffle to the earth, or ascend above the region of the clouds and thunder-forms. Besides, as balloons are formed of materials that are not conductors of electricity, they are not likely to receive strokes, especially as being encompassed with air they fland insulated. Moreover, inflammable air by itself, or unmixed with a certain quantity of common air, will not burn; so that if an electric spark should happen to pass through the balloon, it would not set fire to the inflammable air, unless a hole was made in the covering.

The general principles of aerostation are so little different from those of hydrostatics, that it may seem superfluous to insist much upon them. It is a fact universally known, That when a body is immersed in any fluid, if its weight be less than an equal bulk of that fluid, it will rise to the surface; but if heavier, it will sink; and if equal, it will remain in the place where it is left. For this reason smoke ascends into the atmosphere, and heated air in that which is colder. The ascent of the latter is shown in a very easy and satisfactory manner by bringing a red-hot iron under one of the scales of a balance, by which the latter is instantly made to ascend; for, as soon as the red-hot iron is brought under the scale, the hot air being lighter than that which is colder, ascends, and strikes the bottom, which is thus impelled upwards, and the opposite scale descends, as if a weight had been put into it.

Upon this simple principle depends the whole theory of aerostation; for it is the same thing whether we render the air lighter by introducing a quantity of heat into it, or by causing a quantity of gas specifically lighter than the common atmosphere in a certain space; both will ascend, and for the same reason. A cubic foot of air, by the most accurate experiments, has been found to weigh about 554 grains, and to be expanded by every degree of heat, marked on Fahrenheit's thermometer, about 1/4th part of the whole. By heating a quantity of air, therefore, to 500 degrees of Fahrenheit, we will double its bulk when the thermometer stands at 54 in the open air, and in the same proportion we will diminish its weight; and if such a quantity of this hot air be inclosed in a bag, that the excess of the weight of an equal bulk of common air weighs more than the bag with the air contained in it, both the bag and air will rise into the atmosphere, and continue to do so until they arrive at a place where the external air is naturally so much rarified that the weight becomes equal; and here the whole will float.

The power of hot air in raising weights, or rather that by which it is itself impelled upwards, may be shewn in the following manner: Roll up a sheet of paper into a conical form, and, by thrusting a pin into it near the apex, prevent it from unrolling. Fasten it then, by its apex, under one of the scales of a balance by means of a thread, and, having properly counterpoised it by weights, put it into the opposite scale; apply the flame of a candle underneath, you will instantly perceive the cone to rise, and it will not be brought into equilibrium with the other but by a much greater weight than those who have never seen the experiment would believe. If we try this experiment with more accuracy, by getting proper receptacles made which contain determinate quantities of air, we will find that the power of the heat depends much more on the capacity of the bag which contains it than could be well supposed. Thus, let a cubical receptacle be made of a small wooden frame covered with paper capable of containing one foot of air, and let the power of a candle be tried with this as above directed for the paper cone. It will then be found that a certain weight may be raised; but a much greater one will be raised by having a receptacle of the same kind which contains two cubic feet; a still greater ought to be made by one of three feet, a yet greater by one of four feet, &c. and this even though the very same candle be made use of; nor is it known to what extent even the power of this small flame might be carried.

From these experiments it appears, that in the aerostatic machines constructed on Montgolfier's plan, it must be an advantage to have them as large as possible; because..."
AEROSTATION.

Principles.

How balloons might rise by the common heat of the atmosphere.

Because a smaller quantity of fire will then have a greater effect in raising them, and the danger from that element, which in this kind of machines is chiefly to be dreaded, will be in a great measure avoided. On this subject it may be remarked, that as the cubical contents of a globe, or any other figure of which balloons are made, increase much more rapidly than their surfaces, there must ultimately be a degree of magnitude at which the smallest imaginable heat would raise any weight whatever. Thus, supposing any aërostatic machine capable of containing 500 cubic feet, and the air within it to be only one degree hotter than the external atmosphere; the tendency of this machine to rise, even without the application of artificial heat, would be near an ounce. Let its capacity be increased 16 times; and the tendency to rise will be equivalent to a pound, though this may be done without making the machine 16 times heavier than before. It is certain, however, that all aërostatic machines have a tendency to produce or preserve heat within them, which would by no means be imagined by those who have not made the experiment. When Mefirs Charles and Robert made their longest aërial voyage of 500 miles, they had the curiosity to try the temperature of the air within their balloon, in comparison with that of the external atmosphere; and at this time they found, that when the external atmosphere was 65°, the thermometer, within the balloon, stood at 104°. Such a difference of temperature must have given a machine of the magnitude which carried them a considerable ascending power independent of any other cause, as it amounted to 41 grains on every cubic foot; and therefore in a machine containing 50,000 cubic feet would have been about 200 pounds. Hence we may easily account for what happened at Dijon, and is recorded by Mr Morveau. "A balloon, intended to be filled with inflammable air, being completed, was, by way of trial, filled with the common air, and in that state exposed to the atmosphere. Now it was observed, and indeed a similar observation had been made before, that the air within the balloon was much hotter than the external air: the thermometer in the former stood at 120°; whereas in the latter, even when the sun shone upon it, the thermometer stood at 84°. This showed a considerable degree of rarefaction within the balloon; and consequently it was suspected, that by means of this rarefaction alone, especially if it were to increase a little, the balloon might ascend. On the 30th of May, about noon, the wind being rather strong, agitated the balloon so that two men were employed to take care of it; but notwithstanding all their endeavours, it escaped from its confinement, and, lifting up about 65 pounds weight of cords, equal to a circle of many feet high, and, passing over some houses, went to the distance of 250 yards, where at length it was properly secured."

This difference between the external and internal heat being so very considerable, must have a great influence upon aërostatic machines, and will undoubtedly influence those filled with inflammable air as well as the other kind. Nor is it unlikely, that the short time which many aërial voyagers have been able to continue in the atmosphere, may have been owing to the want of a method of preventing this internal heat. It may naturally be supposed, and indeed it has always been found, that balloons, in passing through the higher regions of the atmosphere, acquire a very considerable quantity of moisture, not only from the rain or snow they sometimes meet with, but even from the dew and vapour which condenses upon them. On this an evaporation will instantly take place; and as it is the property of this operation to produce a very violent cold, the internal heat of the balloon must be soon exhausted in such a manner as to make it become specifically heavier than the common atmosphere, and consequently descend in a much shorter time than it would have done by the mere loss of air. To this, in all probability, we are to ascribe the descent of the balloon which carried Mefirs Blanchard and Jeffries; and which appeared extraordinary to many people, that they were obliged to have recourse to an imaginary attraction in the waters of the ocean in order to solve the phenomenon. This supposition is rejected by Mr Cavalcado, who explains the matter, by remarking, that in two former voyages made with the same machine, it could not long support two men in the atmosphere; so that we had no occasion to wonder at its weakness on this occasion. "As for its rising higher (says he) just when it got over the land, that may be easily accounted for. In the first place, the two travellers threw out their clothes just about that time; secondly, in consequence of the wind's then increasing, the balloon travelled at a much greater rate than it had done whilst over the sea; which increase of velocity lessened its tendency to descend: besides which, the vicissitudes of heat and cold may produce a very considerable effect; for if we suppose, that the air over the land was colder than that over the sea, the balloon coming into the latter from the former, continued to be hotter than the circumambient air for some time after; and consequently, it was comparatively much lighter when in the cold air over the land, than when in the hotter air over the sea; hence it floated easier in the former than in the latter case.""
of their shape.

For experimental purposes, both the inflammable and rarefied air-balloons may be made of paper; the former being made of that kind called thin-paper, varnished over with linseed-oil; the latter either of that or any other kind, without varnish. In order to avoid the danger of burning, however, it has been proposed to impregnate the paper of which these small rarefied air-balloons are made with solution of fulminate of potassa, alum, or some other salt; but this does not seem to be necessary. Those filled with inflammable air have been made of gold-beater skin or peeled bladders; but the cheaper material of paper is undoubtedly preferable.

For aerostatic machines of a larger size, the material universally employed is varnished silk, and for those of the rarefied-air kind, linen painted over with fine-size colour, or lined with paper. The best varnish for an inflammable air-balloon is that made with bird-lime, and recommended by Mr Faujas de Saint-Fond, in a treatise published on the subject. The following is his method of preparing it: “Take one pound of bird-lime, put it into a new proper earthen pot that can resist the fire, and let it boil gently for about one hour, viz. till it ceases to crackle; or, which is the same thing, till it is so far boiled, as that a drop of it being let fall upon the fire will burn: then pour upon it a pound of spirits of turpentine, stirring it at the same time with a wooden spatula, and keeping the pot at a good distance from the flames; at least the vapour of this essential oil should take fire. After this, let it boil for about six minutes longer; then pour upon the three pounds of boiling oil of nitrates, linseed, or poppy rendered drying by means of litharge; stir it well, let it boil for a quarter of an hour longer, and the varnish is made. After it has rested for 24 hours, and the sediment has gone to the bottom, decant it into another pot; and when you want to use it, warm, and apply it with a flat brush upon the silk stuff, whilst that is kept well stretched. One coat of it may be sufficient; but if two are necessary, it will be proper to give one each side, and to let them dry in the open air while the silk remains extended.”

Mr Cavallo gives the following method of preparing this varnish, which he prefers to that of M. d Sr St Fond.—“In order to render linseed-oil drying, boil it with two ounces of succarum faturna and three ounces of litharge, for every pint of oil, till the oil has dissolved them, which will be accomplished in half an hour; then put a pound of bird-lime and half a pint of the drying oil into a pot (iron or copper pots are the safest for this purpose), the capacity of which may be equal to about one gallon, and let it boil very gently over a slow charcoal fire till the birdlime ceases to crackle, which will be in about half or three quarters of an hour; then pour upon it two pints and a half more of drying oil, and let it boil for one hour longer, stirring it very frequently with an iron or wooden spatula. As the varnish, whilst boiling, and especially when it is nearly done, swells very much, care should be had to remove, in those cafes, the pot from the fire, and to replace it when the varnish fiddles, otherwise it will boil over. Whilst the fluid is boiling, the operator should, from time to time, examine whether the varnish has boiled enough; which is thus known:—Take some of it upon the blade of a knife, and then, after rubbing the blade of another knife upon it, separate the knives; and when on this separation, the varnish begins to form threads between the two, you may conclude that it is done; and, without losing time, it must be removed from the fire. When it is almost, though not quite, cold, add about an equal quantity of spirit of turpentine: mix it well together, and let it rest till the next day; when, having warmed it a little, strain and bottle it. It is too thick, add some more spirit of turpentine. When this varnish is laid upon the silk, the stuff should be made perfectly dry, and stretched; if the varnish, which ought to be used lukewarm, may fill up the pores of the fluid. The varnish should be laid once very thin upon one side of the stuff; and about 12 hours after, two other coats of it should be laid on, one on each side; and, 24 hours after, the silk may be used, though in cold weather, it may be left to dry some time longer.”

Much has been said in France of their elastic gum-
varnish, and its composition kept a secret; but Mr Baldwin, after many expensive trials, declares to the world what he considers as the secret; and it is merely this: "Take any quantity of caoutchouc, as two ounces averdupois; cut it into small bits with a pair of scissors; put a strong iron ladle (like that used by plumbers) over a common pilot or other fire. The fire must be gentle, glowing, and without smoke. When the ladle is hot, much below a red heat, put in a bit of iron or brass spoon. Two pounds or three times its weight of smoking oil, has stood a month, or not so long, on a lump of quicklime, to make it more or less drying), is to be put into the melted caoutchouc, and stirred till hot, and the whole poured into a glazed vessel, through a coarse gauze or fine sieve. When iced and clear, which will be in a few minutes, it will be fit for use either hot or cold." Mr Baldwin is not at liberty, he observes, to publish the art of laying on the varnish: but says, that it consists in making nointine motion in the varnish, which would create minute bubbles; that therefore brushes are improper. Mr Blanchard's method of making galum varnish for the silk of a balloon, is the following: "Divide elastic gum (caoutchouc) cut small in five times its weight of spirit of turpentine, by keeping them some days together; then boil one ounce of this solution in eight ounces of drying linseed-oil for a few minutes; lastly, strain it. It must be used warm." The pieces of silk for the balloon must be cut out of a proper size, according to the dimensions, after the varnish is sufficiently dry. They may be joined by laying about half an inch of the edge of one piece over the edge of the other, and sewing them by a double stitching. Mr Blanchard uses expeditiously the following method. He lays about half an inch of the edging of one piece flat over the edge of the other, and passes a hot iron over it; in doing which a piece of paper ought to be laid both under and over the silk. The joining may be rendered more secure by running it with a silk thread, and stitching a ribbon over it. The ribbons laid over seams may be stuck with common glue, provided the varnish of the silk is properly dried. When the glue is quite dry, the ribbons should be varnished over, to prevent their being unglued by the rain.

49

Of cutting the gores for a globe.

AEROSTATION.

Practice.

The best method of cutting the pieces of silk that are to form a balloon, is to describe a pattern of wood or stiff card-paper, and then to cut the silk upon it. As the edges of such a pattern are not perfect circles, they cannot be described by a pair of compasses; but the best method of drawing them is as follows. First, draw, on a flat surface two right lines AE and BC, perpendicular to each other. Secondly, find the circumference answering to the given diameter of the balloon in feet and decimals of a foot; and make AD and DE each equal to a quarter of the circumference, so that the whole length AE of the pattern may be equal to half the circumference. Thirdly, divided AD into 18 equal parts; and to the points of division apply the lines fg, hi, kl, &c. parallel to each other, and perpendicular to AD. Fourthly, divide the whole circumference in twice the given number of pieces, and make DC and BB each equal to the quotient of this division; so that the whole, BC, is equal to the greatest breadth of one of these pieces. Fifthly, multiply the abovementioned quotient by the decimals annexed to fg, viz. 0.99619, and then the product expresses the length of fg; again multiply the same length of DE by the decimals annexed to hi, and the product expresses the length of hi; and, in short, the product arising from the multiplication of the length of DC by the decimals annexed to each of the parallel lines, gives the length of that line. Lastly, having found the lengths of all these lines, draw by hand a curve-line passing through all the extremities of the said lines, and that is the edge of one quarter of the pattern. The other quarters may be easily described, by applying to them a piece of paper cut according to that already found.—Suppose, for example, that the diameter of the balloon to be constructed is 20 feet, and that it is required to make it of 12 pieces: then, in order to draw the pattern for those pieces, find the circumference of the balloon, which is 62.83 feet, and dividing it by four, the quotient is 15.7 feet; make therefore AD equal to 15.7 feet, and DE likewise of the same length. Divide the circumference 62.83 by 24, which is double the number of pieces that are to form the balloon, and the quotient, 2.618 feet, is the length of DC and likewise of BD; so that BC is equal to 5.236 feet. Then, having divided the line AD into 18 equal parts, and having drawn the parallel lines from those points of division, find the length of each of those lines by multiplying 2.618 by the decimals annexed to that line. Thus, 2.618 multiplied by 0.99619, gives 2.608 feet for the length of fg; and again, multiplying 2.618 by 0.98481, gives 2.578 feet for the length of hi; and so of the rest.—In cutting the pieces after such a pattern, care should be taken to leave them about three quarters of an inch all round larger than the pattern, which will be taken up by the seams.

To the upper part of the balloon there should be adapted, and well fitted in, a valve opening inward; to which should be fastened a string passing through a hole made in a small piece of round wood fixed in the lower part of the balloon opposite to the valve, the end of this string fastened to the car below, so that the aeronaut may open the valve when occasion requires. The action of this valve may be understood from fig. 6. A round brass plate AB has a round hole CD, about two or three inches diameter, covered on both sides with strong smooth leather. On the inside there is a shutter E, which is covered with leather, which is to close the hole CD; being about two inches larger in diameter than the hole. It is fastened to the leather of the plate AB; and by a spring, which need not be very strong, it is kept against the hole. The elasticity of the gas itself will help to keep it shut. This shutter the string is fastened, by which it is occasionally opened for the escape of gas. A small string
Practice. AEROSTATION.

Filling or other security should be fixed to the fuller and the plate, as not to admit a flutter to be observed beyond a certain line distance. To the lower part of the balloon two pipes should be fixed, made of the same stuff as the envelope; 8 inches diameter for a balloon of 30 feet, and proportionally larger for balloons of a greater capacity. They must be long enough for the car. For balloons of 18 feet and less diameter, one neck or pipe will be sufficient. These pipes are the apertures through which the inflammable gas is introduced into the balloon.

The car or boat is best made of wicker-work, covered with leather, and well painted or varnished over; and the proper method of suspending it, is by ropes proceeding from the net which goes over the balloon. This net should be formed to the shape of the balloon, and fall down to the middle of it, with various cords proceeding from it to the circumference of a circle about two feet below the balloon; and from that circle other ropes should go to the edge of the boat. This circle may be made of wood, or of several pieces of slender cane bound together. The meshes of the net may be small at top, against which part of the balloon the inflammable air exerts the greatest force; and increase in size as they recede from the top. A hoop has sometimes been applied round the middle of the balloon to fasten the net. This, though not absolutely necessary, is built made of pieces of cane bound together, and covered with leather.

With regard to the rarefied-air machines, Mr Cavallo recommends first to soak the cloth in a solution of turpentine and common fize, using one pound of each to every gallon of water; and when the cloth is quite dry, to paint it over in the inside with some earthy colour, and strong size or glue. When this paint has dried perfectly, it will then be proper to varnish it with oil varnish, which might dry before it could penetrate quite through the cloth. Simple drying linseed oil will answer the purpose as well as any, provided it be not very fluid.

It now only remains to give some account of the method by which aerostatic machines may be filled with their proper gas, in order to give them their power of ascendency into the atmosphere; and here we are enabled to determine with much greater precision concerning the inflammable-air balloons than the others. With regard to them, a primary consideration is, that the proper method of procuring the inflammable air. It may be obtained in various ways, as has been shown under the article AEROSCOPY. But the most advantageous methods are, by applying acids to certain metals; by exposing animal, vegetable, and some mineral substances, in a close vessel to a strong fire; or by transmitting the vapour of certain fluids through red-hot tubes.

1. In the first of these methods, iron, zinc, and vitriolic acid, are the materials most generally used. The vitriolic acid must be diluted by five or six parts of water. Iron may be expected to yield in the common way 1,700 times its own bulk of gas; or one cubic foot of inflammable air to be produced by 42 ounces of iron, the like weight of oil of vitriol, and 212 ounces of water. Six ounces of zinc, an equal weight of oil of vitriol, and 50 ounces of water, are necessary for producing the same quantity of gas. It is more proper to use the turnings or shavings of great pieces of iron, as of cannons, &c. than the filings of that metal, because the heat attending the vitriolic acid will be more readily through the interiors of the turnings when they are heated together, than through the filings, which stick closer to one another. The weight of the inflammable air thus obtained by means of acid of vitriol, is, in the common way of procuring it, generally one seventh part of the weight of common air; but with the necessary precautions for philosophical experiments, less than one-tenth of the weight of common air. Two other sorts of elastic fluids are sometimes generated with the inflammable air. These may be separated from it by passing the inflammable air through water in which quicklime has been dissolved. The water will absorb these fluids, cool the inflammable air, and prevent its overheating the balloon when introduced into it.

Fig. 7. of Plate III. represents an apparatus described by Mr Cavallo as proper for filling balloons of the size of two or three feet in diameter with inflammable air, after passing it through water.—A is the bottle with the ingredients; BCD a tube fastened in the neck of B, and passing through C, the cork of the other bottle, in which there is another hole made to receive the tube on which the balloon is tied. Thus it is plain, that the inflammable air coming out of the tube D will pass first through the water of the bottle E and then into the balloon. Two small casks may be used instead of the bottles A and E.

2. Inflammable air may be obtained at a much cheaper rate by the action of fire on various substances, but the gas which these yield is not so light as that produced by the evaporation of acids and metals. The substances proper to be used in this way are, pit-coal, asphaltum, amber, rock-oil, and other minerals; wood and especially oak, camphor-oil, spirits of wine, ether, and animal substances, which yield air in different degrees, and of various specific gravities; but pit-coal is the preferable substance. A pound of this exposed to a red heat, yields about three cubic feet of inflammable air, which, whether it be passed through water or not, weighs about one-fourth of the weight of common air. Dr Priestley found, as we have elsewhere noticed, that animal or vegetable substances will yield six or seven times more inflammable air when the fire is suddenly increased than when it is gently raised, though it be afterwards made very strong. Mr Cavallo observes, that the various substances above enumerated generally yield all their inflammable air in about one hour's time. The general method is, to incline the substances in iron or earthen vessels, and thus expose them to a strong fire sufficient to make the vessels red-hot: the inflammable air proceeding from the aperture of the vessel is received into a tube or receiver, and passing through the tube or worm, is at last collected in a balloon or other vessel. A gun barrel has often been used for effects of this kind. The substance is put into it to the fill full or eight inches of its lowest part; the remainder filled with dry sand: a tube, adapted to the mouth of the barrel, is brought into a balloon under an inverted receiver; and the part of the barrel containing the substance being put into the fire and made red-hot, the inflammable air is collected.
AEROSTATION. Practice.

It has indeed been recommended to use zinc instead of iron fillings, because white vitriol, the salt produced by the union of the vitriolic acid and zinc, is much more volatile than the green iron produced by the union of the same acid with iron. But though this is undoubtedly the case, it will as certainly be found, upon trial, that the superior price of the zinc will be more than an equivalent for all the advantage that can be derived from the additional price of the white vitriol.

For a balloon of 30 feet diameter, Mr Cavallo recommends 3900 pounds of iron fillings, as much oil of vitriol, and 19,500 pounds of water. These proportions, however, appear too great with respect to the acid and metal, and too little with respect to the water. Oil of vitriol will not exert its power upon iron unless it be diluted with five or six times its quantity of water; in which case, a much smaller quantity of both acid and metal will serve. Mr Lunardi, who from the number of his voyages had certainly much practical knowledge in aerostation, filled his balloon at Edinburgh and Glasgow with about 2000 pounds of iron (the borings of cannon procured from Carron), as much vitriolic acid, and 12,000 pounds of water. The iron was placed in his vessels in layers, with straw between them, in order to increase the surface. His apparatus was not materially different from that of Mr Cavallo, represented bottom of Plate I. fig. 2. where AA are two tins, about three feet in diameter and nearly two feet deep, inverted in large tins BB filled with water. In the bottom of each of the inverted tubes a hole is made, and a tube E of tin adapted, which is about seven inches in diameter, and seven or eight long. To these tubes the silken ones of the balloon are to be tied. Round each of the tubes B, five, six, or more strong casks are placed; in the top of each two holes are made, and to one of these holes a tin tube is adapted, and the flap shaped, that, passing over the edge of the tube B, and through the water, it may terminate with its aperture under the inverted tube A. The other hole of these casks serves for the introduction of materials, and is filled with a wooden plug. When the balloon is to be filled, put the net over it, and let it be suspended as shown by CDF; and having expelled all the common air from it, let the silken tubes be fastened round the tin ones EE; and the materials being put into the casks, the inflammable air, passing into the balloon, will soon distend, and render it capable of supporting itself; after which the rope GH may be slipped off. As the balloon continues to be filled, the net is adjusted properly round it; the cords that surmount it are fastened to the hoop MN; then the boat IK being placed between the two sets of casks, it is fastened to the hoop MN, and every thing that is required to be sent up, as ballots, instruments, &c. is placed in it. At last, when the balloon is little more than three quarters full, the silken tubes are separated from the tin ones of the inverted tubes, and their extremities being tied up, are placed in the boat. Lastly, the aeronauts being seated in the boat, the lateral ropes are slipped off, and the machine is aban doned to the air. (See Blanchard's balloon, Plate II.)

This apparatus was at last reduced by Mr Lunardi to its utmost simplicity, by using only two large casks, and suffering the vapour to go into the balloon without passing through water. Thus his balloon was filled.
in less than half an hour, when, before, it had required two hours at least. The dissipation of heat calls in the ground was also an additional convenience, as it created no confusion, and rendered the materials much more easily conveyed into them.

With regard to the rarefied-air balloons, the method of filling them is as follows. A scaffold ABCD, the breadth of which is at least two-thirds of the diameter of the machine, is elevated about six or eight feet above the ground. From the middle of it descends a well E, riling about two or three feet above it, and reaching to the ground, furnished with a door or two, through which the fire in the well is supplied with fuel. The well should be constructed of brick or of plastered wood, and its diameter should be somewhat less than that of the machine. On each side of the scaffold are erected two masts HI, KL, each of which has a pulley at the top, and rendered firm by means of ropes KG, KP, HJ, HG. The machine to be filled is to be placed on the scaffold, with the neck round the aperture of the well. The rope pailling over the pullies of the two masts, serves, by pulling its two ends, to lift the balloon about 15 feet or more above the scaffold; and the rest of the machine is represented by the dotted lines in the figure MNO. The machine is kept steady, and held down, whilst filling, by ropes passing through loops or holes about its equator; and these ropes may easily be disengaged from the machine, by filling them through the loops when it is able to sustain itself. The proper combustibles to be lighted in the scaffold are those which burn quick, and increase the smoke; because it is hot air, and not smoke, that is required to be introduced into the machine. Small wood and straw have been found to be very fit for this purpose. Mr Cavallo observes, as the result of many experiments with small machines, that spirits of wine are upon the whole the best combustible; but its price may prevent its being used for large machines. As the current of hot air ascends, the machine will soon dilate, and lift itself above the scaffold and gallery which was covered by it. The scullers, or sails, are then placed in the gallery. When the machine makes efforts to ascend, its aperture must be brought, by means of the ropes annexed to it, towards the side of the well a little above the scaffold; the fire-place is then suspended in it, the firelighted in the grate, and the lateral ropes being slipped off the scaffold, the machine is abandoned to the air. (See Mongolfier's balloon, Plate II.) It has been determined by accurate experiments, that only one-third of the common air can be expelled from these large machines; and therefore the ascending power of the rarefied air in them can be esteemed as only equal to half an ounce averduпоise for every cubic foot.

The conduct of balloons, when constructed, filled, and actually ascending in the atmosphere, is an object of great importance in the practice of aeronautics. The method generally used for elevating or lowering the balloons with rarefied air, has been the increase or diminution of the fire; and this is entirely at the command of the aeronaut, as long as he has any fuel in the gallery. The inflammable-air balloons have been generally raised or lowered by diminishing the fire in the boat, or by letting out some of the gas through the valve: but the alternate escape of the air in descending, and discharge of the ballast for ascending, will by degrees render the machine incapable of floating; for in the air it is impossible to supply the lobs of ballast, and very difficult to supply that of inflammable air. These balloons will also rise or fall by means of the rarefaction or condensation of the inclosed air, occasioned by heat and cold. It has been proposed to aid a balloon in its alternate motion of ascent and descent, by annexing to it a vessel of common air, which might be condensed for lowering the machine, and rarefied again, by expelling part of it, for raising the machine. But a vessel adapted to this purpose must be very strong; and, after all, the assistance afforded by it would not be very considerable. M. Meunier, in order to attain this end, proposes to inclose one balloon filled with common air in another filled with inflammable air: as the balloon ascends, the inflammable air is diluted, and of course compresses the internal balloon containing the common air; and by diminishing its quantity, lessens its weight. If it should be necessary to supply this lobs, he says it may be easily done by a pair of bellows fixed in the gallery. Others have proposed to annex a small machine with rarefied air to an inflammable-air balloon by ropes, at such a distance that the fire of the former might not affect the inflammable air of the latter, the whole apparatus, thus combined, of balloons formed on the two principles of heated and inflammable air, might be raised or lowered by merely increasing or diminishing the fire in the lower balloon.

Wings or oars are the only means of this sort that have been used with some success; and as Mr Cavallo observes, they seem to be capable of considerable improvement. Although great effects are not to be expected from them when the machine goes at a great rate, the best methods of moving those wings are by the human strength applied similarly to the oars of a waterman. They may be made in general of silk and wood, or of pitch and wood; and when used must be turned edgewise when they are moved in the direction in which the machine is intended to be impelled, but flat in the opposite direction. Fig. 9. Plate III. is the representation of one of Mr Blanchard's wings. Fig. 10. is one of those used by Mr Lunardi, which consists of many silk flutters or valves, ABCD, DEF, &c. every one of which opens on one side only, viz. ADBC opens upon the line AB, DECF opens upon the line DC, &c. In consequence of this construction, this sort of oars do not need being turned edgewise. Fig. 11. represents one of the wings constructed by Count Zambecari, which consists of a piece of silk stretched between two tin tubes set at an angle; but these wings are so contrived as to turn edgewise by themselves when they go on one direction. Other contrivances have been made to direct aerostatic machines, but they have mostly been invented to effect a power upon them as upon a flag. It appears, however, that they can have no effect when a machine is only moved by the wind alone, because the circumambient air is at rest in respect to the machine. The case is quite different with a vessel at sea, because the water on which it floats tends whilst the vessel goes on; but it must be time and experience that can realize the expectations suggested by these contrivances.
AESCHYLS, a town in the Netherlands, in the dukedom of Brabant, and capital of the dukedom of Aershot. It is on the river Demer, ten miles east of Malines or Mechlin, and eight north of Louvain. L. Long. 5. 4. N. Lat. 51. 15.

AERGUSINUS, an epithet given to such things as resemble or partake of the nature of the rust of copper.

AERGO, in natural history, properly signifies the rust of copper, whether natural or artificial. The former is found about copper mines, and the latter, called verderges, made by corroding copper-plates with acids. See verdigris.

AERUSCATORES, in antiquity, a kind of flogging beggars, not unlike gypsies, who drew money from the credulous by fortune-telling. It was also a denomination given to gripping exaudors, or collectors of the revenue. The Gallic, or priests of Cybele, were called Aerucker magus undris, and aeruscatens, on account of their begging or collecting alms in the streets; to which end they had little bellies whereby to draw people's attention to them, much like some orders of mendicants in some parts of Europe.

AER, or Aery, among sportmen. See Aery.

Æs exorium, in antiquity, a sum paid by baccalors, as a penalty for living single to old age. This tax for not marrying seems to have been first imposed in the year of Rome 350, under the censorship of M. Parius Camillus and M. Polthamus. At the census, or review of the people, each person was asked, Erus ex ore gentium? æs exorium posset, or fashion it? He who had no wife was hereupon fined after a certain rate, called æs exorium.

Æs per et librum was a formula in the Roman law, whereby purchases and sales are ratified. Originally the phrase seems to have been only used in speaking of things sold by weight, or by the feet; but it afterwards was used on other occasions. Hence even in adoptions, as there was a kind of imaginary purchase; the formula whereof expressed, that the person adopted was bought per et librum.

Æs Flamum, yellow copper, among the Romans, an appellation given to the crimson kind of brass.

Æs Callirhoe, a term used by the German miners, for a substance which sometimes occurs to those who work upon cobalt, and is used for the making the fine blue colour called finalis.

Æs Ulteria, a chemical preparation, made of thin leaves of copper, sulphur, and nitre, placed flatum super flamum in a crucible, and set in a charcoal fire till all the sulphur is consumed; after which, the copper is taken out of the crucible, and reduced to powder. Some quench the leaves of copper in vinegar, and repeat the calcination. Its principal use is in colouring glass, to which it gives a beautiful tincture. The forgers use it as a detergent, and some have given it internally; but it is certainly a very dangerous medicine, and should be avoided.

ÆSCHINES, a Socratic philosopher, the son of Charinus a funnager-maker. He was continually with Socrates; which occasioned this philosopher to say, that the funnager-maker's son was the only person who knew how to pay a due regard to him. It is said that poverty obliged him to go to Sicily to Dionysius the Tyrant; and that he met with great contempt from Plato, but was extremely well received by Aristotle, whom he showed some of his dialogues, and received from him a handsome reward. He would not venture to press his philosophy and Art in Athens, in the company of the high officers; but he set up a school to maintain himself. He afterwards wrote orations for the Roman, Phrynichus, in Phrygia, ranks him among the best orators, and mentions his orations as the standard of the pure Atticism style. Hermodor had spoken very highly of him. He also wrote several dialogues; of which there are only two extant, 1. concerning Virtue, whether it can be taught. 2. Eryxius, or Cretaceous; concerning riches, whether they are good. 3. Achelous, concerning death, whether it is to be feared. Sir le Clerc has given a Latin translation of them, with notes, and several dissertations prefixed by three oratoroi.

ÆSCHYLUS, the tragic poet, was born at Athens. Authors differ in regard to the time of his birth, some placing it in the 6th, others in the 7th Olympiad; but according to Stanley, who relies on the Athenian铭s, he was born in the 6th Olympiad. He was the son of Euphorion, and brother to Cynegius and Aminias, who distinguished themselves in the battle of Marathon, and the sea-fight of Salamis, at which engagements Æschylus was likewise present. In this last action, according to Liodoros Siculus, Aminias, the younger of the three brothers, commanded a squadron of ships, and behaved with so much conduct and bravery, that he sunk the admiral of the Persian fleet, and glorified himself above all the Athenians. To this brother his poet was under a particular obligation, for saving his life: Ælian relates, that Æschylus being charged by the Athenians with certain blasphemous expressions in some of his pieces, was accused of impiety, and condemned to be floned to death: they were just going to put the sentence in execution, when Aminias, with a happy prescience of mind, throwing aside his cloak, showed his arm without a band, which he had lost at the battle of Salamis in defence of his country. This sight made such an impression on the judges, that, touched with the remembrance of his valor, and with the friendship he showed for his brother, they pardoned Æschylus. Our poet, however, related the indignity of this persecution, and resolved to leave a place where his life had been in danger. He became more determined in his resolution when he found his pieces less pleasing to the Athenians than those of Sophocles, tho' a much younger writer. Some affirm, that Æschylus never sat down to compose but when he had drunk liberally. He wrote a great number of tragedies, of which there are but seven remaining; and notwithstanding the sharp censures of some critics, he must be allowed to have been the father of the tragic art. In the time of the Histiae, there was no public theatre to act upon; the theatres driving about from place to place in a cart. Æschylus furnished his actors with masks, and dressed them suitably to their characters. Hellicris is said to have introduced the basin, to make them appear more like heroes. The ancients gave Æschylus also the praise of having been the first who removed murders and shocking sights from the eyes of the spectators. He is said likewise to have defined the number of the choruses. M. Le Fevre has observed, that Æschylus never represented women in love in his tragedies; which, he says, was not suited to his genius; but, in representing a woman transported with fury, he was incomparable. Longinus says, that Æschylus...
Æsculapius has a noble boldness of expression; and that
his imagination is lofty and heroic. It must be owned,
however, that he affected pompous words, and that his
feuds too often obscured by figures: this gave Sal-
mus occasion to say, that he was more difficult to
be understood than the scripture itel. But notwithstanding
their imperfections, the character of his works was
highly honored by the Athenians, who made a public de-
cree that his tragedies should be played after his death.
He was killed in the 69th year of his age, by an eagle
letting full a tortoise upon his head as he was walking in
the fields. He had the honor of a pompous funeral from
the Sicilians, who buried him near the river Gel-
a; and the tragedians of the country performed plays
and theatrical exercises at his tomb.—The best edition
of his plays is that of London, 1663, fol. with a Lu-
tin translation, and a learned commentary by Thomas
Stanley.

Æschynomene, bastard sensitive-plant:
A genus of the decandria order, belonging to the dia-
delphia class of plants, and is characterized by these:
The calyx has one leaf; campion-like petal-like
flats; the lips equal, but the inferior one two-
cleft, the inferior tridentate. The corolla is pilo-
aceous; the banner curved and subfusiform; the alae
ovate, obtuse, and shorter than the banner; and the
carpus united, pointed, and the length of the ala.
The stamina consists of 10 simple g-lipped filaments;
the anthers small. The pistil is an ovoid pellucid
vulgaris; the style is styliform and ascending,
the stigma simple and somewhat obvolute. The pericar-
plus is a long comma-like, unilocular jointed pod.
The seeds are kidney-shaped, and solitary within each
joint. Of this genus there are reckoned six.

Species. 1. The alpina (as well as the rest of this gen-
us) is native of warm countries. It rises to the height
of four or five feet, having a single herbaceous flake,
which is rough in some parts. The leaves come out on
every side towards the top, forming a sort of head;
the flowers come out between the leaves, two or three
above, one after the other; after the flower is past,
the calyx becomes a flat jointed pod, which, when ripe,
parts at the joints, and in such division is lodged a single
kidney-shaped seed. 2. The American, feldam: more
than two feet in height. The flowers come out from
the leaves on branching footstalks, five or six to
gether; there are much less than the former, and of
a paler yellow color. The seed is lodged in pods like the
other. 3. The arborv. grows to the height of six or
seven feet, with a single stem; the flowers come out two
or three together, of a copper color, and as large as
those of the alpina. 4. The Sicilian hath woody stems, and
branches garnished with smooth leaves. The flowers
are small, of a deep yellow color, and consist of six
sepals hanging downward. The seed is contained in
a smooth pod not jointed. 5. The pinnata, rises to
the height of about three feet, has flowers of a pale
yellow color, which comes out sometimes single, at
other times two or three upon each footstalk. The seeds
are contained in a long-calcated pod having 13 or 14
divisions, each of which lodges a single seed. 6. The
grandiflora, rises six or eight feet high, with a woody
stem, sending out branches towards the top, garnished
with obtuse leaves. The flowers are large, yellow, and
succeeded by large pods containing kidney-shaped
seeds.

Cult. These plants are propagated by seeds,
which should be sown early in the spring, on a bed;
and when the pods have grown enough to be
removed, they should be placed in a sepulchral box
filled with light earth, and plunged into a hot-bed.
As they increase in size, they must be removed into
large pots; but if these are too large, the plants
will not thrive. They must be brought forward early in
the year, otherwise the second kind will not perfect its feed.

Æsculapius, in the Heathen mythology, the
god of physic, was the son of Apollo and the nymph
Cleonis. He was educated by the Centaur Chiron,
who taught him physic; by which means. Æsculapius
secured the most delicate diseases. But Jupiter, enraged
at his refraining to the Hippocrites, who had been torn
in pieces by his own horses, killed him with a thunder
bolt. According to Celsus, there were three deities
of this name: the first, the son of Apollo, worshipped
in Arcadia, who invented the probe, and landscapes for
wounds; the second, the brother of Mercury, killed
by lightning; and the third, the son of Ares and
Arotius, who first taught the art of tooth-drawing
and setting. At Epidaurus, Æsculapius's statue was
made of gold and ivory, with a long beard, his head
wound with rays, holding in one hand a knotty stick,
and the other entwined with a serpent; he was seated
on a throne of the same materials as his statue, and
had a dog lying at his feet. The Romans crowned him
with laurel, to represent his descent from Apollo, and
the Phyllistans represented him as bearded. The cock,
the raven, and the goat, were sacred to this deity. His
chief temples were at Pergamus, Smyrna, Tris, a city
in Ionia, and the isle of Cos; in all which, votive
tables were hung up, showing the diseases cured
by his assistance. But his most famous shrine was at Epidau-
rus; where, every five years, games were instituted to
him, nine days after the Ethiopian games at Corinth.

Æsculus, the Horse-chestnut:
A genus of the monogynia order, belonging to the heptandria
class of plants; and ranking, in the natural method,
under the 30th order, Tribulata. —The characters are:
The caulis is a small single-leaved, bellied perianthium,
divided into five segments. The corolla (except in the
bearded, where it is four-petaled and close) consists of
five roundish, flat expanding petals, unequal-colored,
and with narrow claws inserted into the calyx.
The stamina have seven filiform declinate filaments,
the length of the corolla; the anthers ascending. The
pistillum is a roundish germen, ending in a subulate
filum; the stigma pointed. The pericarpium is a
leathery, roundish, tribacular, three-valved capsule.
The seeds are two, sublobular. In this genus Van Rozen and Miller observe both male and herma-
phrodite flowers. There are two

Species. 1. The hippocampum, or common horse-
chestnut. It was brought from the northern parts of
Asia about the year 1570, and from Vienna about
1592. This tree makes a noble appearance all the
month of May, the exuberances of the branches being
terminated by fine spikes of flowers spotted with rose
colours, so that the whole tree becomes covered with them.
It is quick in its growth; so that in a few years it ar-
ives at a size large enough to afford a good shade in
summer,
summer, as also to produce plenty of flowers. They have, however, this great inconvenience, that their wood is of no use, being unfit even for burning; and their leaves beginning to fall in July, soon deprive the trees of their beauty. There is something very singular in the growth of these trees; which is, that the whole shoot is performed in less than three weeks after the buds are opened. — The nuts are reckoned good food for hares. In Turkey, they are ground, and mixed with the provender for these animals, especially those which are troubled with coughs, and broken winded. Deer are also very fond of the fruit; and at the time of their ripening keep much about the trees, but especially in strong winds, when the nuts are blown down, which they carefully watch, and greedily devour as they fall.

2. The pavia, or scarlet-flowering horse-chestnut, a native of Carolina, the Brazil, and the East. It grows to about fifteen or sixteen feet high; and there is a delicacy in this tree that makes it desirable. The bark of the young shoots is quite smooth, and the growing shoots in summer are of a redish hue. The leaves are palmated, being pretty much like those of the horse-chestnut, only much smaller, and the indentures at the edges are deeper and much more acute. The lobes of which they are composed are spear-shaped; they are five in number, are united at their base, and stand on a long red footstalk. The leaves grow opposite by pairs on the branches, which are spread abroad on every side. The flowers come out from the ends of the branches. The first appearance of the buds is in May; though they will not be in full bloom till the middle of June. They are of a bright red color, and consequently have a pleasing effect among the vast tribe of yellow-flowering forts which show themselves in bloom at that season. They continue in succession for upwards of six weeks, and sometimes succeeded by ripe seeds in our gardens.

Propagation and culture. The first species is propagated from the nuts. In autumn, therefore, when they fall, a sufficient quantity should be gathered. These should be sown soon afterwards in drills, about two inches in depth. If the nuts are kept till spring, many of them will be faulty; but where the eminence cannot be got ready before, and they are kept too long, it may be proper to put them in water, to try their goodness. The good nuts will sink, whilst those which are faulty will swim; so that by proving them this way you may be sure of good nuts, and have more promising hopes of a crop. In the spring the plants will come up; and when they have been one year, they may be taken up, their top-roots shortened, and afterwards planted in the nursery. When they are of sufficient size to be planted out finally, they must be taken out of the nursery with care, the great side-shoots and the bruised parts of the roots should be taken off, and then planted in large holes level with the surface of the ground, at the top of their roots; the fibres being laid spread and lapped in the fine mold, and the turf also worked to the bottom. A stake should be placed to keep them safe from the winds; and they must be fenced from the cattle till they are of a sufficient size to defend themselves. The best season for all this work is October. After the trees are planted, neither knife nor hatchet should come near them; but they should be left to Nature to form their beautiful parabolic heads, and assume their utmost beauty. — The horse-chestnut, like most other trees, delights most in good fat land; but it will grow exceedingly well on clayey and marley grounds.

Miller says, “When these trees are transplanted, their roots should be preferred as entire as possible, for they do not succeed well when torn or cut: nor should any of the branches be shortened, for there is scarce any tree that will not bear amputation better than this; so that when any branches are by accident broken, they should be cut off close by the stem, that the wound may heal over.”

The second species is propagated, 1. By budding it upon the young plants of the horse-chestnut. These stocks should be raised as was directed in that article. They should be planted in the nursery way, one foot asunder, and two feet distant in the rows, which should be kept clean of weeds, and must be dug between every winter till the operation is to be performed. After they have stood in the nursery-ground about two years, and have made at least one good summer’s floor, the summer following is the time for the operation. Then, having your cuttings ready soon after midsummer, the evenings and cloudy weather should be made choice of for the work. Whoever has a great number of trees to inoculate, must regard no weather, but keep working, to get his business over before the season ends; and, indeed, a good hand will be always pretty sure of success be the weather what it will. If the stocks were healthy, the summer following they will make pretty good shoots; and in a year or two after that will flower. This is one method of propagating this tree; and those plants that are propagated this way will grow to a larger size than those raised immediately from seeds. — 2. This tree also may be propagated by seeds; which will sometimes ripen with us, and may be obtained out of our gardens. The manner of raising them this way is as follows: Let a warm border be prepared; and if it is not naturally sandy, left drift-sand be mixed with the soil; and in this border let the seeds be sown in the month of March, about half an inch deep. After this, constant weeding must be observed; and when the plants are come up, if they could be shaded in the heat of the day, it would be much better. These, with now and then a gentle watering in a dry season, will be all the precautions they will require the first summer. The winter following, if the situation is not extremely well sheltered, protection must be given them from the hard black frosts, which will otherwise often destroy them; so that it will be the safest way to have the bed hooped, to cover them with mats in such weather, if the situation is not well defended: if it is, this trouble may be saved; for, even when young, they are tolerably hardy. In about two or three years they may be removed into the nursery, or planted where they are to remain, and they will flower in three or four years after. The usual nursery-care must be taken of them when planted in that way; and the best time for planting them there, or where they are to remain, is October; though they will grow exceeding well if removed in any of the winter months; but if planted late in the spring, they will require more watering, as the ground will not be so regularly settled.
ÆSOP, the Phrygian, lived in the time of Solon, about the 50th Olympiad, under the reign of Croesus the last king of Lydia. As to genius and abilities, he was greatly indebted to nature; but in other respects not to fortune, being born a slave and extremely deformed. St. Jerome, speaking of him, says he was fortunate in his birth, condition in life, and death; shining thereby at his deformity, servile state, and tragical end. His great genius, however, enabled him to support his misfortunes; and in order to alleviate the hardships of servitude, he composed those entertaining and instructive fables which have acquired him so much reputation. He is generally supposed to have been the inventor of that kind of writing; but this is contested by several, particularly Quintilian, who seems to think that Hesiod was the first author of fables. Æop, however, certainly improved this art to a very great degree; and hence it is that he has been accounted the author of this sort of productions:

Nunc ego possui veribus facinus.

If any thoughts in these iambics shine,

The invention’s Æop’s, and the veris is mine.

The first master whom Æop served, was one Carausus Demarchus, an inhabitant of Athens; and there in all probability he acquired his purity in the Greek tongue. After him he had several masters; and at length came under a philosopher named Idmon or Iadmon who enfranchised him. After he had recovered his liberty, he soon acquired a great reputation amongst the Greeks; so that, according to Meziriac, the report of his wisdom having reached Croesus, he sent to inquire after him, and engaged him in his service. He travelled through Greece, according to the same author: whether for his own pleasure, or upon the affairs of Croesus, is uncertain; and passing by Athens soon after Phalaris had usurped the sovereign power, and finding that the Athenians bore the yoke very impatiently, he told them the fable of the frogs who petitioned Jupiter for a king. The images made use of by Æop are certainly very happy inventions to instruct mankind; they polish all that is necessary to perfect a precept, having a mixture of the useful with the agreeable. Æop the fabulist (Aesius Gallus) was deservedly esteemed, since he did not, after the manner of the philosophers, rigidly and imperiously delineate such things as were proper to be advised and persuaded; but, framing entertaining and agreeable apologies, he thereby charms and captivates the human mind.

Æop was put to death at Delphi. Plutarch tells us that he came there with a great quantity of gold and silver, being ordered by Croesus to offer a sacrifice to Apollo, and to give a considerable sum to each inhabitant: but a quarrel arising between him and the Delphians, he sent back the money to Croesus; for he thought those to whom the prince designed it, had rendered themselves unworthy of it. The inhabitants of Delphi contrived an accusation of sacrilege against him; and pretending they had convicted him, threw him headlong from a rock. For this cruelty and injustice, we are told they were visited with famine and pestilence; and consulting the oracle, they received for answer, that the god designed this as a punishment for their treatment of Æop: they endeavoured to make an atonement, by raising a pyramid to his honour.

Æop (Clodiaus), a celebrated actor, who flourished about the 670th year of Rome. He and Roscius were contemporaries, and the best performers who ever appeared upon the Roman stage, the former excelling in tragedy, the latter in comedy. Cicero put himself under their direction to perfect his action. Æop lived in a most expensive manner, and at one entertainment is said to have had a dish which cost above eight hundred pounds; this dish, we are told, was filled with singing and speaking birds, some of which cost near 500. The delight which Æop took in these sorts of birds proceeded, as Mr. Bayle observes, from the expense. He did not make a dish of them because they could speak, according to the refinement of Pliny upon this circumstance, this motive being only by accident; but because of their extraordinary price. If they had been any birds that could not speak, and yet more scarce and dear than these, he would have procured such for his table. Æop's son was no less luxurious than the father, for he dissolved pearls for his guests to swallow. Some speak of this as a common practice of his; but others mention his falling into this excess only on a particular day, when he was treating his friends. Horace speaks only of one pearl of great value, which he dissolved in vinegar, and drank. Æop, notwithstanding his expenses, is said to have died worth above 160,000. When he was upon the stage, he entered into his part to such a degree, as sometimes to be feized with a perfect ecstacy: Plutarch mentions it as reported of him, that whilst he was representing Aneas deliberating how he should revenge himself on Thetis, he was so transported beyond himself in the heat of action, that with his truncheon he smote one of the servant crossing the stage, and laid him dead on the spot.

ÆSTIMATIO CAPITIS, a term met with in old law-books for a fine anciently ordained to be paid for offences committed against persons of quality, according to their several degrees.

ÆSTIVAL, in a general sense, denotes something connected with, or belonging to, summer. Hence æstival sign, æstival solstice, &c.

ÆSTUARIA, in geography, denotes an arm of the sea, which runs a good way within land. Such is the Chesapeake-bay, &c. ÆSTUARIES, in ancient baths, were secret passages from the hypocaust into the chambers.

ÆSTUARY, among physicians, a vapour-bath, or any other instrument for conveying heat to the body.

ÆSYMNIIUM, in antiquity, a monument erected to the memory of the heroes, by Æsumus the Megarean. He consulting the oracle in what manner the Megarians might be most happily governed, was answered, If they hold communion with the more numerous: whom he taking for the dead, built the said monument, and a sepulchre that took within its compass the monument; imagining, that thus the dead would afflict their confulsions. (Pausanias.)

ÆTH, or ÆTH, a strong little town in the Austrian Netherlands and province of Hainaut, situated on the river Dender, about twenty miles S. W. of Brussels.

ÆTHALIA, a lat. (anc. geog.) now Elba; an island.


AETh, island on the coast of Ethiopia, in compass an hundred miles, abounding in iron, as the still does. Stephanus calls it Aethale. The port of Aethalia was called Argus. (Diod. Sicul.)

AETHESAN, See AETHESAN.

Aether, is usually understood of a thin, subsible matter, or medium, much finer and rarer than air; which commencing from the limits of our atmosphere, pervades the whole heavenly space. - The word is Greek, ἀήθερος, supposed to be formed from the verb ἀφέω, "to burn, to flame." Some of the ancients, particularly Anaxagoras, supposing it of the nature of fire. See Fire.

The philosophers cannot conceive that the largest part of the creation should be perfectly void; and therefore they fill it with a species of matter under the denomination of aether. But they vary extremely as to the nature and character of this aether. Some conceive it as a body of a generis, appointed only to fill up the vacancies between the heavenly bodies; and therefore confined to the regions above our atmosphere. Others suppose it of so subsible and penetrating a nature, as to pervade the air, and other bodies, and polishes the pores and intervals thereof. Others deny the existence of any such specific matter; and think the air itself, by that immense tenuity and expansion it is found capable of, may diffuse itself through the interstellar spaces, and be the only matter found therein.

In effect, aether, being no object of our sense, but the mere work of imagination, brought only upon the stage for the sake of hypothesis, or to solve some phenomenon, real or imaginary; authors take the liberty to modify it as they please. Some suppose it of an elementary nature, like other bodies; and only distinguished by its tenuity, and the other affections consequent thereon: which is the philosophical aether. Others will have it of another species, and not elementary; but rather a sort of fifth element, of a purer, more refined, and spiritual nature, than the substances about our earth: and void of the common affections thereof, as gravity, &c. The heavenly species being the supposed region or residence of a more exalted class of beings, the medium must be more exalted in proportion. Such is the ancient and popular idea of aether, or aetherial matter.

The term aether being thus embarrased with a variety of ideas and arbitrarily applied to so many different things, the later and fewer philosophers choose to set it aside, and in lieu thereof substitute other more determinate ones. Thus, the Cartesians use the term materia fictilib; which is their aether: and Sir Isaac Newton, sometimes a fictile spirit, as in the close of his Principia; and sometimes a fictile or aetherial medium, as in his Optics.

The truth is, there are abundance of confederations, which seem to evince the existence of some matter in the air, much finer than the air itself. There is an unknown something, which remains behind when the air is taken away; as appears from certain effects which we see produced in vacuo. Heat, Sir Isaac Newton observes, communicated through a vacuum almost as readily as through air: but such communication cannot be without some interjacent body, to act as a medium. And such body may be fictible enough to penetrate the pores of glass; and may be very well con-

cluded to penetrate those of all other bodies, and consequently be diffused through all the parts of space which answers to the full character of an aether. See Heat.

The existence of such an aetherial medium being settled, that author proceeds to its properties; inferring it to be not only rarer and more fluid than air, but exceedingly more elastic and active: in virtue of which properties, he shows, that a great part of the phenomena of nature may be produced by it. To the weight, e. g. of this medium, it attributes gravitation, or the weight of all other bodies; and to its elaticity, the elastic force of the air and of nervous fibres, and the emission, reflection, refraction, and other phenomena of light; as also, sensation, muscular motion, &c. In fine, this same matter forms the primum mobile, the first source or spring of physical action in the modern system.

The Cartesians aether is supposed not only to pervade, but adequately to fill, all the vacancies of bodies; and thus to make an abdication in the universe.

But Sir Isaac Newton overturns this opinion from divers considerations; by showing, that the celestial spaces are void of all sensible resistance: for, hence it follows, that the matter contained therein must be immensely rare, in regard the resistance of bodies is chiefly as their densitity; so that if the heavens were thus adequately filled with a medium or matter, how fictible soever, they would resist the motion of the planets and comets much more than quicksilver or gold.

The late discoveries in electricity have thrown great light upon this subject, and rendered it extremely probable that the aether so often talked of is no other than the electric fluid, or solar light, which diffuses itself throughout the whole system of nature. See Electricity, Fire, Heat, Light, &c.

Aether, in chemistry, the lightest, most volatile, and most inflammable of all liquids, is produced by distillation of acids with redined spirit of wine. See Chemistry and Pharmacy (Indexes).

Aetherial Etymus, something that belongs to, or partakes of, the nature of Aether. Thus we say, the aetherial space, aetherial regions, &c.

Some of the ancients divided the universe, with respect to the matter contained therein, into elementary and aetherial.

Under the aetherial world was included all that space above the uppermost element, viz. fire. This they supposed to be perfectly homogeneous, incorruptible, unchangeable, &c. See Corruption. The Chaldees placed an aetherial world between the empyreum and the region of the fixed stars. Before which, they sometimes also speak of a second aetherial world, meaning by it the fiery orb; and a third aetherial world, by which is meant the planetary region.

Æthiopia. See ETHIOPIA.

Æthiops, Mineral, Natural, and Antimonial. See Pharmacy (Indexes).

Æthusa, in botany, a genus of the pentandria digyna class; and, in the natural method, ranking under the 45th order, Umbellate. The characters are: The calyx is an universal umbel expanding, the interior rays shorter by degrees; with a partial umbel, small, and expanding. There is no universal involucrum; the partial one is dissimilated, with three or five leaflets,
Aetian, born in Syria, was a grammarian, theologian, and physician. His followers were called Aetians.

Aetius, a famous physician, born at Amida in Mesopotamia, and the author of a work entitled Terrae Nativae, which is a collection from the writings of those physicians who went before him. He lived, according to Dr Friend, at the end of the 5th or the beginning of the 6th century.

Aetius, governor of Gallia Narbonensis in the reign of Valentinian III, forced the Franks who were passing into Gaul to repulse the Rhine. He defeated the Goths; and routed Attila king of the Huns, who invaded Gaul with an army of 700,000 men. But the emperor, jealous of the merit of this great man, killed him in 454 with his own hand, under the pretense that he had permitted the invasion of the Huns, after Attila's defeat.

Aetna, in the Itineraries Ethuna, supposed from δ
to burn; according to Bochart, from Athina, a furnace, or Ethuna, darknits, now Monte Cibele: a volcano or burning mountain of Sicily, situated in lat. 38° N. long. 15° E.

This mountain, famous from the remotest antiquity, both for its bulk and terrible eruptions, stands in the eastern part of the island, in a very extensive plain, called Val Demoni, from the notion of its being inhabited by devils, who torment the spirits of the damned in the bowels of this volcano.

Concerning the dimensions of mount Ætna, we can inconceivably extract any thing confident, even from the accounts of the latest and most ingenious travellers. Pindar, who lived about 435 years before Christ, calls it the Piller of heaven, on account of its great height. All modern writers likewise agree, that this mountain is very high, and very large; but differ excessively both as to its height and magnitude: some making it no less than twelve miles high, others eight, others fix, some four, while Mr Brydone, and Sir William Hamilton, who lately ascended to its highest summit, reduce its height to little more than two miles; nay, by some it is reduced to 10,036 feet, somewhat less than two miles. No less remarkable are the differences concerning its circumference: some making it only 60 miles round, others 100; and Signior Recupero, from whom Mr Brydone had his information in this respect, affirms it to be no less than 183 miles in circuit.

We are forry to detract from the merit of Mr Brydone, or to involve in obscurity what he hath been so much pains to elucidate; but every person who compares the account of mount Ætna's circumference, given by Signior Recupero, and to which Mr Brydone seems to have attented, with its apparent circumference on the map prefixed to that gentleman's tour through Sicily and Malta, must at once be struck with the prodigious disparity. Indeed, it is plain, that, in the map, the geographer hath not left room for any such mountain; nor can we help thinking, that, by comparing the distances of some of the Sicilian towns from one another, Signior Recupero's dimensions will be found excessively exaggerated. Certain it is, that there the geographer hath placed Catania, which stands at the foot of mount Ætna, on one side, no more than 38 miles from the most distant point of the river Alcanara.
is probably very uncertain.

If we are embarrassed with the circumference of Mount Etna, we are much more so with the accounts relating to its height; and one circumstance, particularly, creates almost insurmountable difficulties. It is agreed upon by all travellers, and among the rest by Sir William Hamilton, that from Catania, where the ascent first begins, to the summit, is no less than 50 miles. The descent on the other side we have no account of; but whatever supposition we make, the height of the mountain must be prodigious. If we suppose it likewise to be 30 miles, and that Mount Etna can be represented by an equilateral triangle, each of whose sides is 30 miles, we will have an amazing elevation indeed, no less than 26 miles perpendicular. Such a height being beyond all credibility, we must contradict the sides of our triangle, in proportion to its basis. We shall begin with allowing 10 miles for the difference between a straight line from Catania to the summit, and the length of the road, occasioned by the inequalities of the mountain; and supposing the descent on the other side to be somewhat shorter, we may call it 15 miles. Mount Etna will now be represented by a scalene triangle, whose base is 30 miles, its longest side 20, and its shortest 15; from which proportions we will still find its height to be but what height, and when all the various relations concerning the height of Etna are compared, we hope it will not be thought presumptuous in us to give it as our opinion, that the true dimensions of this mountain are yet unknown. The following measures are given by different authors:

- Height above the surface of the sea, 10,036 feet. Faujas de S. Fon in his Volcani of the Vivarais.
- Height 12,000 feet. Brydone. Tour to Sicily.
- Height 2500 toises. La Platriere, said as from Recupero.

Diameter 1500 toises — Diameter 30 miles. — Gentille Geogr, comp.

Others make its height only 2000 toises, and its superficies 300 square miles.

Concerning the products and general appearance of this volcano, authors are much better agreed. The journey from Catania to its summit has been lately described by three travellers, M. O'Orville, Mr Brydone, and Sir William Hamilton. All these agree, that this single mountain affords an epitome of the different climates throughout the whole world: towards the foot, it is very hot; farther up, more temperate; and grows gradually more and more colder the higher we ascend. At the very top, it is perpetually covered with snow: from thence the whole island is supplied with that article, so necessary in a hot climate, and without which the natives say Sicily could not be inhabited. So great is the demand for this commodity, that the bishop's revenues, which are considerable, arise from the sale of mount Etna's snow; and he is said to draw 1000l. a year from one small portion lying on the north side of the mountain.

Great quantities of snow and ice are like-wise exported to Malta and Italy, making a considerable branch of commerce. On the north side of this snowy region, Mr Brydone was assured, that there are several small lakes which never thaw; and that the snow mixed with the ashes and salt of the mountain are accumulated to a vast depth. The quantity of salts contained in this mountain, he, with great probability, conjectures to be one reason of the preservation of its snows; for salt creates the coldness of snow to a surprising degree.

In the middle of the snowy regions stands the great crater, or mouth of Etna; from which, though contrary to the usual method of travellers, we shall begin our particular account of this mountain. Sir William Hamilton describes the crater as a little mountain about a quarter of a mile perpendicular, and very steep, situated in the middle of a gently inclining plain, of about nine miles in circumference. Its entirely formed of ashes and stones; and, as Mr Hamilton was informed by several people of Catania, had been thrown up about 25 or 30 years before the time (1769) he visited Mount Etna. Before this mountain was thrown up, there was only a prodigious large chasm, or gulf, in the middle of the abovementioned plain; and it has been remarked, that about once in 100 years the top of Etna falls in; which undoubtedly must be the cafe at certain periods, or the mountain behaved continually to increase in height. As this little mountain, though emitting smoke from every pore, appeared solid and firm, Mr Hamilton and his companions went up to the very top. In the middle is a hollow, about two miles and a half in circumference, according to Mr Hamilton; three miles and a half, according to Mr Brydone; and three or four, according to Mr O'Orville. The inside is eroded with voids with falt and sulphur of different colours. It goes shelving down, from the top, like an inverted cone: the depth, in Mr Hamilton's opinion, nearly corresponding to the height of the little mountain. From many places of this space issue volumes of sulphurous smoke, which being much heavier than the circumambient air, instead of ascending in it, roll down the side of the mountain, till, coming to a more dense atmosphere, it floats off horizontally, and forms a large tract in the air, according to the direction of the wind; which, happily for our travellers, carried it exactly to the side opposite to which they were placed. In the middle of this funnel is the tremendous and unfathomable gulph, so much celebrated in all ages, both as the terror of this life, and the place of punishment in the next. From this gulph continually issue terrible and confused noises, which in eruptions are increased to such a degree as to be heard at a prodigious distance. Its diameter is probably very different at different times: for Mr Hamilton observed, by the wind clearing away the smoke from time to time, that the inverted hollow cone was contracted almost to a point; while Mr O'Orville and Mr Brydone found the opening very large. Both Mr Brydone and Mr Hamilton found the crater too hot to descend into it; but Mr O'Orville was bolder: and accordingly he and his fellow-traveller, fastened to ropes which two or three men held at a distance for fear of accidents, descended as near as possible to the brink of the gulph; but the small flames and smoke which issued from it on every side, and a greenish sulphur, and pumice-flakes, quite black, which covered the margin, would not permit them to come so near
as to have a full view. They only saw difficulty in the middle, a mass of matter which rose, in the shape of a cone, to the height of about 60 feet, and which towards the base, as far as their sight could reach, might be seen for 6 or 8 miles. While they were observing this substance, some motion was perceived on the north side, opposite to that whereon they stood: and immediately the mountain began to send forth smoke and ashes. This eruption was preceded by a fearful increase of its internal roarings; which, however, did not continue; but after a moment's dilatation, as if to give it vent, the volcano resumed its former tranquillity; but as it was by no means proper to make a longer stay in such a place, our travellers immediately returned to their attendants.

On the summit of mount Étna, Mr Hamilton observes, that he was sensible of a difficulty in respiration from the too great suffocation of the air, independent of what arose from the sulphurous smoke of the mountain. Mr Brydooe takes no notice of this, which probably arose from the air being in a more rarefied state at the time of Mr Hamilton's observations than of Mr Brydone's; the barometer, as observed by the former, standing at 18 inches and 10 lines, by the latter at 19 inches 6 lines.

In these high regions there is generally a very violent wind, which, as all our travellers found it constantly blowing from the south, may possibly be commonly directed from that point. Here Mr Brydone's thermometer fell to 27°.

The top of Étna being above the common region of vapours, the heavens appear with exceeeing great splendor.—Mr Brydone and his company observed, as they ascended in the night, that the number of stars seemed to be infinitely increased, and the light of each of them appeared brighter than usual: the whiteness of the milky-way was like a pure flame which shot across the heavens; and, with the naked eye, they could observe clusters of stars that were invisible from below. Had Jupiter been visible, he is of opinion that none of his satellitcs might have been discovered with the naked eye, or at least with a very small pocket-glass.

He likewise took notice of several of those meteors called falling stars; which appeared as much elevated as when viewed from the plain: a proof, according to Mr Blydone, that the celestial bodies move in regions “much beyond the bounds of some philosophers who have alligned to our atmosphere.”

To have a full and clear prospect from the summit of mount Étna, it is necessary to be there before sunrise; as the vapours rising by the sun, the day-time, will obscure every object: accordingly, our travellers took care to arrive there early enough; and all agree, that the beauty of the prospect from thence cannot be expressed.—Here Mr Brydone and Mr Hamilton had a view of Calabria in Italy, with the sea beyond it: the Lipari islands; and Stromboli a volcano at about 70 miles distance, appeared just under their feet; the whole island of Sicily, with its rivers, towns, harbours, &c. appeared distinct, as if seen on a map. Naples, a Sicilian author, affirms, that the African coast, as well as that of Naples, with many of its islands, have been discovered from the top of Étna. The visible horizon here is not less than 8 or 900 miles in diameter. The pyramidal shadow of the mountain reaches across the whole island, and far into the sea on the other side, forming a visible tract in the air, which, as the sun rises above the horizon, is shortened, and at last confined to the neighbourhood of Étna. The most beautiful part of the scene, however, in Mr Brydone's opinion, is the mountain itself, the island of Sicily, and the numerous islands lying round it. These last seem to be close to the skirts of Étna; the distances appearing reduced to nothing.

This mountain is divided into three zones, which division might properly enough be distinguished by the names of torrid, temperate, and frigid: they are, however, known by the names of the Fuedes; or Regions cultura, the cultivated or fertile region; the Sylviea, woody, osiperme region; and the Region deserta, the frigid, or desert zone, or region. These are plainly distinguished from the summit. The Region deserta is marked round by a circle of snow and ice, which extends on all sides to the distance of about eight miles, beginning at the foot of the crater. Greatest part of this region is smooth and even. This is immediately succeeded by the Sylviea, or woody region; which forms a circle of the most beautiful green, surrounding the mountain on all sides. This region is variegated with a vast number of mountains of a conical form, thrown up by Étna in those eruptions which burst out from its sides. Mr Hamilton counted 34 on the Carania side, each having its crater, many with large trees flourishing both within and without the craters. All these except a few of late date, have acquired a wonderful degree of fertility. The circumference of this zone, or great circle, according to Reeperbo, is not less than 700 or 80 miles. It is everywhere succeeded by the Regions cultura: which is much broader than the rest, and extends on all sides to the foot of the mountain. Here terrible devastations are sometimes committed by the eruptions; and the whole region is likewise full of conical mountains thrown up by them. The circumference of this region, is, by Reeperbo, reckoned 182 miles; but we have already given our reasons for rejecting these dimensions. This region is bounded by the sea to the south and south-east; and on all other sides, by the river Semetus and Alcantara, which form the boundaries of mount Étna.

About a mile below the foot of the great crater, are il Torre dal Foso, by some supposed to have been built by the philosopher Empedocles, who took up his habitation here, the better to study the nature of mount Étna. By others they are supposed to be ruins of a temple of Vulcan. They are of brick, and seem to have been ornamented with marble. Some where in this region also, Mr D'Orville found a great oblong block of polished marble, eight or ten feet high, and three or four thick; though how it came there was quite unaccountable to him. From Mr D'Orville's and Mr Brydone's accounts we must reckon this part of the mountain pretty steep; but Mr Hamilton says, that the ascent was so gradual, as not to be in the least fatiguing; and had it not been for the snows, they might have rode on their mules to the very foot of the crater.

The woody region extends eight or nine miles beyond the Region deserta, but differs greatly in the temperature of the climate. Mr Hamilton observed a gradual decrease of the vegetation as he advanced; the underparts being covered with large timber trees, which grew...
The woody region, especially the Culta, grew gradually less as he approached the third region, at last they degenerated into the small plants of the northern climates. He also observed quantities of juniper and tansey; and was informed by his guide, that later in the season (he visited Ætna in June 1769) there are a great many curious plants, and in some places rhubarb and saffron in great plenty. In Carrera’s history of Catania, there is a list of all the plants and herbs of Ætna, in alphabetical order.

This region is extolled by Mr. Brydone as one of the most delightful spots on earth. He lodged for a night in a large cave near the middle, formed by one of the most ancient lavas. It is called La Spelonca del Capi­ole, or the goat’s cavern, because it is frequented by those animals, which take refuge there in bad weather. Here his rest was disturbed by a mountain thrown up in the eruption 1766. It discharged great quantities of smoke, and made several explosions like heavy cannon fired at a distance; but they could observe no appearance of fire.

This gentleman likewise visited the eastern side of the Regione Culta, intending to have ascended that way to the summit, and defended again on the south side to Catania; but found it impracticable; though what the uninmountable difficulties were, he does not mention. On this side, part of the woody region was destroyed, in 1755, by an immense torrent of boiling water which issued from the great crater. Its traces were still very visible, about a mile and a half broad, and in some places more. The foil was then only beginning to recover its vegetative power, which it seems this torrent had destroyed for 4 years. Near this place are some beautiful woods of cork, and evergreen oak, growing absolutely out of the lava, the soil having hardly filled the crevices, and not far off our traveller observed 7 little mountains that seemed to have been formed by a late eruption. Each of these had a regular cop, or crater, on the top; and, in some, the middle gulph, or Vesorina, as the Sicilians call it, was still open. Into these gulphs Mr. Brydone tumbled down stones, and heard the noise for a long time after. All the fields round, to a considerable distance, were covered with large burnt stones discharged from these little volcanoes.

The woody region, especially the east side, called Carpineto, abounds with very large chestnut-trees; the most remarkable of which has been called, from its size, Castagno de Gueto Cavallari, or chestnut-tree of an hundred horse. M. Brydone was greatly disappointed at the sight of this tree, as it is only a bush of five large ones growing together; but his guides assured him, that all these five were once united into one stem; and Signor Recupero told him, that he himself had been at the expense of carrying up peatants with tools to dig round this bush of trees, and found all the stems united below ground in one root. The circumference, as measured by Mefirs Brydone and Glover, who accompanied him, amounted to 204 feet. Another of these, about a mile and a half higher on the mountain, is called Castagna del Cala: it rises from one odd stem to a considerable height; after which it branches out, and is a much finer object than the other: this was measured two feet above the ground, and found to be 76 feet in circumference. A third, called Castagna del Naro, is pretty nearly of the same size; and Maffi, one of the most esteemed Sicilian authors, affirms that he has seen solid oaks there upwards of 40 feet round. All these, growing on a thick rich soil, which seems originally to have been formed of ashes thrown out by the mountain.

Here the barometer stood at 26 inches 5 lines and an half, indicating an elevation of near 4000 feet. The Piedmontese district is covered with towns, villages, monasteries, &c., and is well peopled, notwithstanding the danger of such a situation: but the fertility of the soil tempts people to inhabit that country; and their superfluous confidence in their saints, with the propensity mankind have to despise danger which they do not see, render them as secure there as in any other place. Here, Sir William Hamilton observes, they keep their vines low, contrary to the custom of those who inhabit mount Vefuvius; and they produce stronger wines, but not in such abundance: here also many terrible eruptions have burst forth; particularly one in 1669. At the foot of the mountain raised by that eruption, is a hole, through which Sir William neuse ca­ Hamilton descended, by means of a rope, into several subterraneous caverns, branching out and extending much farther than he chose to venture, the cold there being excessive, and a violent wind extinguishing some of the torches. Many other caverns are known in this and the other regions of Ætna; particularly one near this place called La Spelonca della Palomba, (from the wild pidgeons building their nests there.) Here Mr. Brydone was told that some people had lost their fowls, from having advanced too far, imagining they saw devils and damned spirits. Some of these caverns are made use of as magazines for snow; which they are well adapted for, on account of their extreme cold. These are with great probability supposed by Sir William Hamilton to be the hollows made by the inflowing of the lava in eruptions.

In this region the river Aetis, so much celebrated by the poets, in the fable of Acis and Galatea, takes its rise. It bursts out of the earth at once in a large stream, runs with great rapidity, and about a mile from its source throws itself into the sea. Its water is remarkably cold; and so extremely cold, that it is reckoned dangerous to drink it: it is said, however to have a pithomous quality, from being impregnated with vitriol; in consequence of which cattle have been killed by it. It never freezes, but is said often to contract a greater degree of cold than ice.

Having thus given an account of this mountain in appearance, its quiet and peaceable state, we must now describe its several eruptions during the time of our journey, when it spreads destruction for many miles round, and is capable of striking the boldest with terror.

Sir William Hamilton, who has examined both Vefuvius and Ætna in a very accurate manner, never had an opportunity of seeing an eruption of the latter; but as he is of opinion that the two volcanoes agree perfectly in all respects, only that the latter is on a much larger scale than the former, we hope it will not be unacceptable to our readers to give an account of some of the general appearances of Vefuvius when in a state of eruption, the better to help their ideas concerning Ætna.

It has been already observed, that a smoke constantly issues from the top of Ætna, and that its internal noises never cease. The cave is the same with Vefu­
The first symptom of an approaching eruption is an increase of the smoke in fair weather: after some time, a puff of black smoke is frequently seen to shoot up in the midst of the white to a considerable height. These puffs are attended with considerable explosions: for if this burning matter gets not sufficient vent, the conmotions increase to a prodigious degree. In the night-time the lava appears like a stream of fire, accompanied with flame; but in the day time it has no such appearance; its progress is marked by a white smoke, which by the reflection of the red-hot matter in the night affumes the appearance of flame.

All the abovementioned symptoms preceded the great Eruption in eruption of Ætna in 1669. For several months before 1669, the lava broke forth, the old month, or great crater on the summit, was observed to send forth great quantities of smoke and flame; the top had fallen in, so that the mountain was much lowered; the islands also of Vulcan and Strombolli, two volcanoes to the westward of Sicily, were observed to rage more than usual. Eighteen days before the eruption, the sky was very thick and dark, with thunder, lightning, frequent concussions of the earth, and dreadful subterraneous bellows. On the 11th of March, some time before the lava got vent, a rent was opened in the mountain twelve miles in length, into which, when stones were thrown down, they could not be heard to strike the bottom. Burning rocks, 60 palms (15 of our feet) in length, were thrown up with violence, to the distance of a mile; others of a lesser size were carried three miles off; the internal noises of the mountain were exceedingly dreadful, and the thunder and lightning from the smoke scarce less terrible than they. When the lava at last got vent, it burst out of a vineyard, 20 miles below the great crater, and sprung up into the air to a considerable height. Here it formed a column of flames and ashes, not less, as Sir W. Hamilton conjectures, than half a mile perpendicular in height, and three miles in circumference. For 34 days neither fire nor flames had appeared: but soon after the lava got vent, the mountain became very quiet. The terrible effects of this fiery stream may be imagined from its amazing extent; being, as Sir W. Hamilton observes, no less than 14 miles long, and in many places six in breadth. In its course, it destroyed the habitations of near 30,000 persons; and meeting with a lake four miles in compass, it not only filled it up, though several fathoms deep, but made a mountain in the place of it. Having reached Catania, it destroyed part of its walls, and ran for a considerable length into the sea, forming a safe and beautiful harbour; which, however, was soon filled up by a fresh torrent of the same inflamed matter.

It is not easy for those who have never been present at those terrible operations of nature, to represent to their minds the horrors which must attend the breaking forth of the lava; for though the giving vent to this burning matter generally produces a celloation of the violent efforts of the internal fire, yet at the very instant of its explosion scarce anything can be conceived so dreadful. See VESUVIUS.

When the lava first issues, it appears very fluid, and Hamilton's runs with the rapidity of a swift river; but even then it obtrudes surprizingly the impression of solid bodies: for Sir W. Hamilton could not pierce that of Vesuvius with a stick driven against it with all his force; nor did the largest stone he was able to throw upon it sink, but made a slight impression, and then floated along. This happened almost at the very mouth, when the lava appeared

Thunders &forked or zig-zag lightning, sometimes attended with thunder, and sometimes not, but equally powerful with ordinary lightning. This phenomenon was observed by Sir William Hamilton in the smoke of Vesuvius, and has also been taken notice of in that of Ætna; and where this electrified smoke hath spread over a tract of land, much mischief hath been done by the lightning proceeding from it.

After these dreadfil appearances have continued sometimes four or five months, the lava begins to make its appearance. This is a stream of melted mineral matters, which in Vesuvius commonly boils over the top, but very seldom does so in Ætna; owing to the great weight of the lava, which long before it can be raised to the vast height of mount Ætna, bursts out through some weak place in its side. Upon the appearance of the lava, the violent eruptions of the mountain generally, though not always, cease; for if this burning matter gets not sufficient vent, the conmotions increase to a prodigious degree. In the night-time the lava appears like a stream of fire, accompanied with flame; but in the day-time it has no such appearance; its progress is marked by a white smoke, which by the reflection of the red-hot matter in the night affumes the appearance of flame.
Lava of 1669 described.

Mount Etna, as we have already remarked, has been a celebrated volcano from the remotest antiquity. Diodorus Siculus mentions eruptions of it as happening 500 years before the Trojan war, or 1693 years before the Christian era. From Homer's silence with regard to the phenomenon of Etna, it is to be presumed that the volcano had been many ages in a state of inactivity, and that no tradition of its burning remained among the inhabitants at the time he composed his Odyssey; perhaps it never had emitted flames since the country was peopled. The first eruption taken notice of by ancient, but no means contemporary authors, happened before the Greeks landed on the island, and is supposed to have scared the Sicani from the east part of Sicily.

Pindar, quoted above, is the oldest writer extant who speaks of Etna as a volcano. The first recorded eruption was in the time of Pythagoras. Plato was invited by the younger Dionysius to examine the flame of the mountain after the sixth. It threw up flames and lava near an hundred times between that period and the battle of Pharaldia; it was particularly furious while Sextus Pompeius was adding the horrors of war to its devastations. Charlemagne happened to be at Catania during one of the eruptions; and from his reign the chronicles mention fifteen down to that of the year 1669, the most terrible of them all. Since 1669 there have been several eruptions, but none of them comparable to it. In that which happened in 1706, the lava sprang up into the air to a considerable height, twelve miles below the summit; but formed a stream only six miles in length and one mile in breadth.

The last eruption happened in 1727. From the 10th to the 10th of July, there were signs of its approach. On the 11th, after a little calm, there was a subterraneous noise, like the sound of a drum in a clofe place, and it was followed by a copious burst of black smoke. It was then calm till the 15th, when the same prognostics recurred. On the 17th, the subterraneous noise was heard again; the smoke was more abundant, flight clouds of an earthquake followed, and the lava flowed from behind one of the two little mountains which form the double head of Etna. On the 18th, while the spectators were in anxious expectation of a more severe eruption, all was quiet, and continued so more than 12 hours: soon after they perceived some new shocks, accompanied with much noise; and the mountain threw out a thick fmoak, which, as the wind was westerly, soon darkened the eastern horizon: two hours afterwards a shower of fine black brilliant sand descended; on the east side it was a storm of fomes; and, at the foot of the mountain, a deluge of flashes of fire, of coria, and lava.

These appearances continued the whole day; at the setting of the sun the scene changed. A number of conical flames rose from the volcano; one on the north, another on the south, were very conspicuous, and rose and fell alternately. At three in the morning, the mountain appeared cleft, and the summit formed a burning mafs. The cones of light which arose from the crater were of an immense extent, particularly the two just
just mentioned. The two heads seemed to be cut away; and at their separation was a cone of flame, seemingly composed of many lesser cones. The flame seemed of the height of the mountain placed on the mountain; so that it was probably two miles high, on a base of a mile and a half in diameter. This cone was full covered with a very thick smoke, in which there appeared very brilliant flashes of lightning, a phenomenon which Ætna had not before afforded. At times, sounds like those from the explosion of a large cannon were heard seemingly at a less distance than the mountain. From the cone, as from a fountain, a jet of many flaming volcanic matters were thrown, which were carried to the distance of six or seven miles: from the base of the cone a thick smoke arose, which, for a moment, obscured some parts of the flame, at the time when the rivers of lava broke out. This beautiful appearance continued three quarters of an hour. It began the next night with more force; but continued only half an hour. In the intervals, however, Ætna continued to throw out flames, smoke, fumes ignited, and showers of sand. From the 20th to the 22d, the appearances gradually ceased. The stream of lava was carried towards Bronte and the plain of Lago.

After the eruption, the top of the mountain on the western side was found covered with hardened lava, scoria, and stones. The travellers were annoyed by smoke, by flowers of sand, mephitic vapours, and excessive heat. They saw that the lava which came from the western point divided into two branches, one of which was directed towards Lipecchio; the other, as we have already said, towards the plain of Lago. The lava on the western head of the mountain, had from its various shapes been evidently in a state of fusion: from one of the fissures, the odour was strongly that of sulphur. The thermometer, in descending, was at 40 degrees of Fahrenheit's scale; while near the lava, in the plain of Lago, it was 140 degrees. The lava extended two miles; its width was from 133 to 21 feet, and its depth 3 feet 2 inches. These are the most remarkable circumstances we have been able to collect; that might serve to give an adequate idea of this famous mountain. — Many things, however, concerning the extent, antiquity, &c. of the lavas, remain to be discussed, as well as the opinions of philosophers concerning the origin of the internal fire which produces so much mischief; but the consideration of these belongs to the general article Volcanó, to which the reader is referred. — The fate of Catania and Hybla, which have often been destroyed by eruptions, will be mentioned under their two words. Ætna, Ætna hail, Sol Ætnae, a name given by some authors to the salt ammoniac, which is found on the surface and sides of the openings of Ætna, and other burning mountains after their eruptions; and sometimes on the surface of the ferruginous matter which they throw out. This salt makes a very various appearance in many cases; it is sometimes found in large and thick cakes, sometimes only in form of a thick powder, scattered over the surface of the earth and stones. Some of this salt is yellow, some white, and some greenish. This salt is a concretion of nitre, sulphur, and vitriol, burnt and sublimed together; Borelli found once a vast quantity of this salt on mount Ætna, and tried many experiments on it: from whence he concluded, that this salt is so far from occasioning the explosions of that mountain, as some have supposed, that it does not exist in it, but is formed during the burning.

Phila. Trans. N° 100.

Ætolarcha, in Grecian antiquity, the principal magistrate or governor of the Ætolians.

APOLLO (Domitian), a famous orator, born at Nîmes, nourished under Tiberius and the three succeeding emperors. Quintilian makes frequent mention of him, and commends his pleadings. But he disgraced his talents, by turning informer against some of the most distinguished personages in Rome. Quintilian, in his youth, cultivated the friendship of Domitian very applaudingly. He tells us that his pleadings abounded with pious sayings, and that there were public collections of his witty sayings, some of which he quotes. He also mentions two books of his "On Wittefes." Domitian was once in great danger from an inscription he put upon a statue erected by him in honour of Caligula, where he declared that this prince was a second time consul at the age of 27. This he intended as an encomium, but Caligula taking it as a farce upon his youth, and his infringements of the laws, raised a process against him, and pleaded himself in person. Domitian instead of making a defence, repeated part of the emperor's speech with the highest marks of admiration; after which he fell upon his knees, and, begging pardon, declared, that he dreaded more the eloquence of Caligula than his imperial power. This piece of flattery succeeded so well, that the emperor not only pardoned, but also raised him to the consulship. After died in the reign of Nero, A. D. 59.

AFFA, a weight used on the Gold Coast of Guinea. It is equal to an ounce, and the half of it is called eggebe. Most of the blacks on the Gold Coast give these names to those weights.

AFFECTION, in a general sense, implies an attribute inseparable from its subject. Thus magnitude, figure, weight, &c. are affections of all bodies; and love, fear, hatred, &c. are affections of the mind. — Affection, signifying a settled bent of mind toward a particular being or thing, occupies a middle space between disposition on the one hand, and passion on the other. It is distinguishable from disposition, which being a branch of one's nature, originally, must exist before there can be an opportunity to exert it upon any particular object; whereas Affection can never be original, because, having a special relation to a particular object, it cannot exist till the object has once at least been presented. It is also distinguishable from Passion, which, depending on the real or ideal presence of its object, vanishes with its object: whereas Affection is a lasting connection; and, like other connections, subsists even when we do not think of the person. A familiar example will illustrate this. There may be in one person's mind a disposition to gratitude, which, through want of an object, happens never to be exercised; and which therefore is never discovered even by the person himself. Another, who has the same disposition, meets with a kindly office that makes him grateful to his benefactor: An intimate connection is formed between them, termed affection: which, like other connections, has a permanent existence, though not always in view.

See Moral Philosophy, on disposition.
Affection, for the most part, lies dormant, till an opportunity offer for exerting it; in that circumstance, it is converted into the passion of gratitude; and the opportunity is eagerly seized on to testify gratitude in the warmest manner.

Affection, among physicians, signifies the same as desire. Thus the hysteric affection is the same with the hysteric disease.

Affluers, or Affilers, in law, persons appointed in courts-leets, courts baron, &c. to settle, upon oath, the fines to be imposed upon those who have been guilty of faults arbitrarily punishable.

Affetuoso, or Con Affetto, in the Italian music, intimates that the part to which it is added ought not to be played in a tender moving way, and consequently rather slow than fast.

Affiance, in law, denotes the mutual plighting of troth between a man and woman to marry each other.

Affidavit, signifies an oath in writing, sworn to a false affirmation that what they say is true; and if they make a false affirmation, they are subject to the penalties of perjury.

Affirmation, in logic, the affecting the truth of any proposition.

Affirmation, in law, denotes an indulgence allowed to the people called Quakers; who, in cases where an oath is required from others, may make a solemn affirmation that what they say is true; and if they make a false affirmation, they are subject to the penalties of perjury.

Affirmative, in grammar. Authors distinguish affirmative particles; such is, yes. - The term affirmative is sometimes used substantively. Thus we say, the affirmative is the more probable side of the question: there were so many votes, or voices, for the affirmative.

Affix, in grammar, a particle added at the close of a word, either to diversify its form or alter its signification. We meet with affixes in the Saxon, the German, and other northern languages; but more especially in the Hebrew, and other oriental tongues. The Hebrew affixes are single syllables, frequently single letters, subjoined to nouns and verbs; and contribute not a little to the brevity of that language. The oriental languages are much the same as to the radicals, and differ chiefly from each other as to affixes and prefixes.

Affluat, literally denotes a blast of wind, breath, or vapour, striking with force against another body. The word is Latin, formed from ad "to," and flare "to blow." Naturalists sometimes speak of the affluats of serpents. Tully uses the word figuratively, for a divine inspiration; in which sense, he ascribes all great and eminent accomplishments to a divine affluat. The Pythagorean priests being placed on a tripod or perforated stool, over a holy cave, received the divine affluat, as a late author expresses it, in her belly; and being thus inspired, fell into agitations, like a phrenetic; during which the pronouned, in hollow groans and broken sentences, the will of the deity. This affluat is supposed, by some, to have been a subterraneous flame, or exhalation, wherewith the priests were literally inspired. Accordingly, it had the effects of a real physical disease; the paroxysm of which was so vehement, that Plutarch observes it sometimes proved mortal. Van Dale supposes the pretended inspiration of the Pythia to have arisen from the fumes of aromatics.

Affliction, is not itself, in propriety of medical
Africa lies south of Europe, and west of Asia. It is bounded on the north by the Mediterranean, which separates it from the former; on the north-east, by the Red Sea, which divides it from Asia, and to which it is attached by a neck of land called the Isthmus of Suez, about 60 miles over, separating the Mediterranean from the Red Sea. On the west, south, and east, it is bounded by the main ocean so that it is properly a vast peninsula, bearing some faint resemblance of a pyramid, the base of which is the northern part, running along the shores of the Mediterranean; and the top of the pyramid is the most southerly point, called the Cape of Good Hope. Its greatest length from north to south is 12,000 miles; its greatest breadth from east to west is 3,000 miles; reaching from Lat. 32° N. to 35° S. and from Long. 17° W. to 51° E.

Though the greatest part of this continent hath been in all ages unknown both to the Europeans and Africans, its situation is more favourable than either Europe or Asia for maintaining an intercourse with other nations. It flanks, as it were, in the centre of the three other quarters of the globe; and has thereby a much nearer communication with Europe, Asia, and America, than any one of these has with another. For, (1) it is opposite to Europe in the Mediterranean, for almost 1,000 miles in a line from east to west; the distance feldom 100 miles, never 100 leagues; and sometimes not above 20 leagues. (2) It is opposite to Asia for all the length of the Red Sea, the distance sometimes not exceeding five leagues, seldom fifty. (3) Its coast for the length of about 2,000 miles lies opposite to America at the distance of from 100 to 200 leagues, including the islands; whereas America, unless where it may be a terra incognita, is no where nearer Europe than 1,000 leagues; and Asia, than 2,500.

As the equator divides this continent almost in the middle, the far greatest part of it is within the tropics; and of consequence the heat in some places is almost insupportable by Europeans, being there greatly increased by vast deserts of burning sand. It cannot be doubted, however, that, were the country well cultivated, it would be extremely fertile; and would produce in great abundance not only the necessaries, but also the luxuries, of life. It has been affirmed, that the fuggars of Barbadoes and Jamaica, as also the ginger, cotton, rice, pepper, pimento, cocoa, indigo, &c. of these islands, would thrive in Africa to as much perfection as where they are now produced. Nor can it be doubted, that the East Indian spices, the tea of China and Japan, the coffee of Mocho, &c. would all thrive in some parts of the African coast; as this continent has the advantage of feeling no cold, the climate being either very warm or very temperate.

Whatever may be the case with the internal parts of Africa, it is certain that its coasts are well watered with many very considerable rivers. The Nile and the Niger may be reckoned among the largest in any part of the world, America excepted. The first discharges itself into the Mediterranean, after a prodigious course from its source in Abyssinia. The origin neither of the Nile, nor of the Niger, is certainly known; but that of the latter is supposed to run through a act of land little les than 3,000 miles. Both these rivers annually overflow their banks, fertilizing by that means the countries through which they pass. The Gambia and Senegal rivers are only branches of the Niger. Many vast ridges of mountains also run through different parts of this continent; but their extent is very little known. Some of the most remarkable are, (1.) Those called Atlas, lying between the 20th and 25th degree of north latitude, and supposed almost to divide the continent from east to west. (2.) The mountains of the moon, so called on account of their great height; supposed to be the boundaries between Abyssinia and some of the interior kingdoms. (3.) The mountains of Sierra Leone, so called on account of their abounding with lions, and likewise supposed to be the boundaries of some of the nations. (4.) Those called by the ancients the mountains of God, on account of their being subject to perpetual thunder and lightning. Of all these, however, little more is known than their names.

To what we have already said concerning the produce of Africa, we may add, that no part of the world abounds with gold and silver in a greater degree. Here also ar a prodigious number of elephants; and it is surprising, that neither the ancient nor modern Europe...
peans, notwithstanding their extravagant and insati-
able thirst after gold and silver, should have endea-
voured to establish themselves effectually in a country
much nearer to them than either America or the East
Indies; and where the objects of their desire are found
in equal, if not greater, plenty.

Next to gold and silver, copper is the most valuable
metal; and on this continent is found in great plenty,
imfuch that the mountains of Atlas above
the ancients,

"Only a small part of this continent was known to
the ancients, viz. the kingdom of Egypt, and the nor-
tner coast, comprehending little more than what is
now known by the name of Barbary. It was divided
into Africa Propria, and Africa Interior. Africa Pro-
pria comprehended only the Carthaginian territories.
Africa Interior comprehended all other nations to the
southward of these territories, or those at a greater di-
stance from Rome. The only kingdoms, however,
with which the Romans had any connection, were the
Numidians, the Mauritanians, and the Gætuli. All
these, as well as Egypt, were swallowed up by that
e着重 enormous power, and reduced to the condition of
Roman provinces. But the Romans never seem to have
penetrated beyond the tropic of cancer. There appears,
indeed, to have been some intercourse between them
and the Ethiopians: but the latter always preserved
their liberty; and we find their queen Candace men-
tioned in the times of the apostles, when the Roman
country power was at its highest pitch.

Between the tropic of cancer and the equinocial
line, a multitude of savage nations were supposed to
have their residence, known by the names of Melano-
gætuli, Nigritæ, Blemmyæs, Dolopes, Aïlaceri, Lo-
tophagi, Ichthyophagi, Elephantophagi, &c. (which
are taken notice of, as well as the others already men-
tioned, under their proper names); but that Africa
was a peninsula, seems to have been totally unknown
both to the Europeans and Aïlaticas for many ages.—
It is probable indeed, that some of the Phenicians, and
their offspring the Carthaginians, were not ignorant;
as they carried navigation to a much greater height
than either the Greeks or Romans: but their discove-
ries were all concealed with the greatest care, lest other
nations should reap the benefit of them; and accord-
ingly we can now find no authentic accounts concern-
ing them. The navigation round Africa, in particular,
is recorded by the Greek and Roman writers rather as
a strange amusing tale than as a real transaction; and
as neither the progres of the Phenician and Carthagin-
ián discoveries, nor the extent of their navigation,
were communicated to the rest of mankind, all memo-
rials of their extraordinary skill in naval affairs seem
in a great measure to have perished, when the mari-
time power of the former was annihilated by Alexan-
der's conquest of Tyre, and the empire of the latter
was overthrown by the Romans.

That the peninsula of Africa, however, was in re-
ality failed round by the Phenicians, we have an in-
dible authority; for some of that nation under-
took the voyage, at the command of Necho king of E-
gypt, about 604 years before the Christian era. They
failed from a port in the Red Sea, and after three
years returned by the Mediterranean; and the very
objections that were made to the veracity of their
accounts at that time, are unfavourable proofs to us
that this voyage was really accomplished. They pre-
tended, that, having failed for some time, the sun
became more and more vertical, after which he appeared
in the north, and seemed to recede from them: that
as they returned, the sun gradually seemed to move
southwards; and, after becoming vertical once more,
appeared then in the south side of them as before they
set out. This, which we know must certainly have been
the case, was deemed incredible at that time, and uni-
versal ignorance concerning the extent of this conti-
nent prevailed till the 15th century. The first attempts
towards attaining a knowledge of Africa was made by
the Portuguese in 1412. Notwithstanding their vic-
nity, they had never ventured beyond Cape Non, situ-
ated in about N. lat. 27°: it had received its name
from a supposed impossibility of passing it. This year
they proceeded 160 miles farther, to Cape Bojador;
which stretching a considerable way into the Atlantic
ocean, with rocky cliffs, appeared too dreadful to the
navigators, that they returned without any attempt to
pass it. In an attempt to double this formidable cape,
they discovered the Madera islands in 1419: but Cape
Bojador continued to be the boundary of their conti-
nental discoveries till 1453; when they penetrated
within the tropics, and in a few years discovered the
river Senegal, Cape de Verd, and the islands which lie
off that promontory. In 1449, the western islands,
called the Azores, were discovered; and in 1471, they
first penetrated beyond the line; and were surprized to
find, that the torrid zone, contrary to the opinion of
the ancients, who imagined it to be burnt up
heat, was not only habitable, but fertile and
populous. In 1484, they proceeded 1500 miles beyond the line;
so that they began to entertain hopes of finding that
way a passage to the East Indies; and two years after-
wards, the Cape of Good Hope was discovered by Bar-
tholomew de Diaz; but it was not till the year 1497,
that the Portuguese, under Vasquez de Gama, actu-
ally doubled this cape, and discovered the true shape of the
continent. Thus the coasts of Africa were made per-
fectedly known; and probably the knowledge concerning
its interior parts would have been much greater than
it is, had not the general attention been called off from
this continent by the discovery of America in 1492.

The Romans for a long time maintained their power
in Africa: but in the year 426, Bonifacius, supreme
governor of all the Roman dominions in this quarter,
being compelled to revolt by the treachery of another
general called Actus, and finding himself unable to
contend with the whole force of the Roman em-
pire, called in Geneferic king of the Vandals to his aid;
who thereupon abandoned the provinces he had seized
in Europe, and paffed over into Africa. Bonifacius,
however,
AFRICA [ 227 ]

Africa. however, being soon after reconciled to his empress Placida, endeavoured in vain to persuade the Vandals to retire. Hereupon a war ensued, in which the barbarians proved victorious, and quickly over-ran all the Roman provinces in Africa. In the year 439, a peace was concluded; so that Numauid and some other countries were ceded to the Vandals, who soon after seized all the rest. These barbarians did not long enjoy this ill-gained possession: for, about the year 552, Belisarius drove them out, annexing the provinces to the eastern empire; and in 647, the Saracens, having conquered Musopotamia, Egypt (which is not included in the meaning of the word Africa), Punicia, Arabia, and Palæstine, broke like a torrent into Africa, which they quickly subdued. Their vast empire being in 96 divided into seven kingdoms, the African states retained their independence long after the others were subdued by the Turks; but in the beginning of the 16th century, being afraid of falling under the yoke of Spain, they invited the Turks to their assistance; who first protected, and then enslaved, them. They still continue in a kind of dependence on the Ottoman empire. They are not, however, properly speaking, the subjects of the grand Signior, but call him their protector, paying him an annual tribute. On the coasts, the natives are almost all addicted to piracy; and with such success have they carried on their employment, that the greatest powers in Europe become their tributaries, in order to procure liberty to trade on the Mediterranean.

Concerning even those states which are nearest to Europe, very little is known: but the interior nations are scarce known by name; nor do almost any two of the most learned moderns agree in their division of Africa into kingdoms; and the reason is, that fearfully any traveller hath ever penetrated into these inhospitable regions. According to the best accounts, concerning those regions of Africa lying between Egypt and Barbary, they are divided in the following manner. On the western coast, to the south of Barbary, lie the kingdoms of Biddulgerid, Zaara, Negroland, Loango, Congo, Anga, Benguela, and Terra de Natal. On the eastern coast beyond Egypt, are those of Nubia, Adal, Ajan, Zanguebar (between these two a large desert is interposed), Monomatapa, and Sofola. In the interior parts, the kingdoms of Lower Ethiopia, Abax, Menemuge, and Matanan, are made mention of. The most northerly part, called Caffaria, is well known for the habitation of the Hottentots. In many material circumstances, the inhabitants of this extensive continent agree with each other. If we except the people of Abyssinia, who are tawny, and profess a mixture of Christianity, Judaism, and Paganism, they are all of a black complexion. In their religion, except on the sea-coasts, which have been visited and settled by strangers, they are pagans; and the form of government is everywhere monarchical. Few princes, however, profess a very extensive jurisdiction: for as the natives of this part of Africa are greatly ignorant in all the arts of utility or refinement, they are little acquainted with one another; and generally united in small societies, each governed by its own prince. In Abyssinia, indeed, as well as in Congo, Loango, and Angolo, we are told of powerful monarchs; but on examination, it is found that the authority of these princes stands on a precarious footing, each tribe or separate body of their subjects being under the influence of a petty chief or of their own chiefs, styled Negusi, to whose commands, however contrary to those of the Negus Negash, or king of kings, they are always ready to submit.

The fertility of a country so prodigiously extensive, might be suppos'd more various than we find it to be; yet, there is no medium found in this part of Africa, with regard to the advantages of soil; it is either perfectly barren or extremely fertile. This arises from the intense heat of the sun; which, where it meets with sufficient moisture, produces the utmost luxuriance; and in those countries were there are few rivers, reduces the surface of the earth to a barren land. Of this sort are the countries of Anian and Zaara; which, for want of water, and consequently of all other necessaries, are reduced to perfect deserts, as the name of the latter denotes. In those countries, on the other hand, where there is plenty of water and particularly where the rivers overflow the land part of the year as in Abyssinia, the productions of nature, both of the animal and vegetable kinds, are found in the highest perfection and greatest abundance. The countries of Mandingo, Ethiopia, Congo, Angola, Batua, Tractus, Monomatapa, Cafati, and Mchemenugu, are extremely rich in gold and silver. The bafir metals, likewise, are found in these and many other parts of Africa. But the persons of the natives make the most considerable article in the produce and traffic of this miserable quarter of the globe.

On the Guinea or western coast, the English trade to James Fort, and other settlements near and up the river Gambia; where they exchange their woolen and linen manufactures, their hardware, and spirituous liquors, for the persons of the natives. By the treaty of peace in 1784, the river of Senegal, with its dependencies, were given up to France. Gold and ivory, next to the slave trade, form the principal branches of African commerce. These are carried on from the same coast, where the Dutch and French, as well as English have their settlements for this purpose.

The Portuguese are in possession of the east and west coast of Africa, from the Tropic of Capricorn to the Equator; which immense tract they became masters of by their succcssive attempts and happy discovery and navigation of the Cape of Good Hope. From the coast of Zanguebar, on the eastern side they trade not only for the articles abovementioned, but likewise for several others; as sea, aloes, cineraria, ambergris, and frankincense. The Dutch have settlements towards the southern part of the continent, in the country called Caffaria, or the land of the Hottentots, particularly Cape Town, which is well settled and fortified; where their ships bound to India usually put in, and trade with the natives for their cattle, in exchange for which they give them spirituous liquors. The Portuguese being sovereigns of the greatest part of the coast, have a number of black princes their tributaries. There are some independent princes who have extensive dominions; particularly the kings of Dahome and Welo, the most noted of any for the infamous slave trade. Upwards of 200 European nations traded with Africa in human flesh; and encouraged in the Negro countries, wars, rapine, defolation,
defolation, and murder, that the West India islands might be supplied with that commodity. The annual exportation of poor creatures from Africa for slaves hath exceeded 100,000; numbers of whom are driven down like prey, perhaps 1,000 miles from the coast, who are generally inhabitants of villages that have been surrounded in the night by armed force, and carried off to be sold to traders. Nor do the planters, who purchase them, use any pains to instruct them in religion, to make them amends for the oppression thus exercised upon them. It is said they are unnaturally averse to everything that tends to it; yet the Portuguese, French, and Spaniards, in their settlements, succeed in their attempts to instruct them, as much to the advantage of the commerce as of religion. It is for the fake of Christianity, and the advantages accompanying it, that English slaves embrace every occasion of deferting to the settlements of these nations. But upon this subject the feelings and reflection of that nation have of late been abundantly roused, and in the investigation of it the wisdom of the legislator is soon to be employed.

AFRICAN COMPANY, a society of merchants, established by King Charles the II. for trading to Africa, which trade is now laid open to all the subjects, paying 10 per cent. for maintaining the forts.

AFRICANUS (Julius), an excellent historian of the third century, the author of a chronicle which was greatly esteemed, and in which he reckons 5,000 years from the creation of the world to Julius Caesar. This work, of which we have now only a fragment, was finished the 22nd year of the vulgar era. Africanus also wrote a letter to Origens on the history of Susanna, which he reckoned supposititious; and we have still a letter of his to Ari- fides, in which he reconciles the seeming contradictions in the two genealogies of Christ recorded by St. Matthew and St. Luke.

AFSLAGERS, persons appointed by the burgomasters of Amsterdam to preside over the public sales made in that city. They must always have a clerk of the secretary's office with them, to take an account of the sale. They correspond to our brokers, or auctioneers.

AFT, in the sea language, the same with ABOBT.

AFTBRIRTH, in midwifery, signifies the membranes which surrounded the infant in the womb, generally called the secundines. See MIDWIFERY.

AFTERMATH, in husbandry, signifies the grasr which springs or grows up after mowing.

AFTERNOON, the latter half of the artificial day, or that space between noon and night.

AFTER-PAINS, in midwifery, excessive pains felt in the groin, loins, &c. after the woman is delivered.

AFTER-SWARMs, in the management of bees, are those which leave the hive some time after the first has swarmed. See Bee.

AFWESTAD, a large copper-work belonging to the crown of Sweden, which lies on the Dala, in the province of Dalecarlia, in Sweden. It looks like a town, and has its own church. Here they make copper-plates; and have a mint for small silver coin, as well as a royal post-office. W. Long. 14. 10. N. Lat. 58. 10.

AGA, in the Turkish language, signifies a great lord or commander. Hence the age of the Janizaries is the commander in chief of that corps; as the general of horse is denominated Huseinage. The age of the Janizaries is an officer of great importance. He is the only person who is allowed to appear before the grand signor without his arms across his breast in the posture of a slave. Emanss at Constantinople are in possession of most of the principal posts of the seraglio: The title age is given to them all, whether in employment or not. This title is also given to all such men without employ, and especially to wealthy landholders.

We find also ages in other countries. The chief officers under the Khan of Tartary are called by this name. And among the Algerines, we read of ages chosen from among the blackest of the Barbary pirates, and sent to govern the cities and garrisons of that state. The age of Algiers is the president of the divan, or Senate. For some years, the age was the supreme officer; and governed the state in the absence of the caliph. But the sultan rising against the boluk bahris, or ages, massacred most of them, and transferred the sovereign power to the caliph, with the title of Toy or King.

AGADES, a kingdom and city of Negroland in Africa. It lies nearly under the tropic of Cancer, between Gubur and Cano. The town stands on a river that falls into the Niger; it is walled, and the king's palace is in the midst of it. The king has a retinue, who serve as a guard. The inhabitants are not so black as other negroes, and consist of merchants and artificers. Those that inhabit the fields are shepherds or herdsmen, whose cottages are made of boughs, and are carried about from place to place on the back of oxen. They are fixed on the spot of ground where they intend to feed their cattle. The houses in the city are flatly, and built after the Barbary fashion. This kingdom was, and may be still, tributary to the king of Tombut. It is well watered; and there is great plenty of grass, cattle, fenna, and manna. The prevailing religion is the Mahometan, but very loosely professed. N. Lat. 26. 10. E. Long. 9. 10.

AGALLOCHUM. See XYLO ALOES.

AGALMATA, in antiquity, a term originally used to signify any kind of ornaments in a temple; but afterwards for the statues only, as being most conspicuous.

AGAMEMNON, the son of Atreus by Erope, was captain-general of the Trojan expedition. It was foretold to him by Cpaidra, that his wife Clytemnestra would be his death: yet he returned to her; and accordingly he was slain by Agamemnon, who had gained up on his wife in his absence, and by her means got the government into his own hands.

AGANIPPIDES, in ancient poetry, a designation given to the muses, from a fountain of mount Helicon, called Aganippos.

AGANIPPE, in antiquity, a fountain of Boeotia at mount Helion, on the borders between Phocis and Boeotia, sacred to the muses, and running into the river Perimessaus. (Pliny, Paul. 8.) Ovid seems to make Aganippe and Hippocrene the same. Solinus more truly distinguishes them, and attributes the blending them to poetical licence.

AGAPE, in ecclesiastical history, the love-feast, or feast of charity, in use among the primitive Christians; when
AGA [229] AGA

AGARIC. See Agaricus.

Female Agaric. See Boletus.

Mineral Agaric, a marly earth resembling the vegetable of that name in colour and texture. It is found in the fissures of rocks, and on the roofs of caverns; and is sometimes used as an astringent in fluxes, hemorrhages, &c.

AGARICUS, or Mushroom, a genus of the order of fungi, belonging to the cryptogamia class of plants. Species and uses. Botanical writers enumerate 35 species belonging to this genus; of which the most remarkable are the following.

1. The campœstris, or common mushroom, has the top or cap first of a dirty cream colour, convex, and, if but just expanding, the under part, or what is called the gills, is of a bright flesh red: this colour lasts but a little time before it turns darker; and when the plant is old, or has been some time expanded, the gills become of a dark brown, the cap almost flat, of a dirty colour, and often a little scaly. It differs much in size in different plants, being from an inch to seven inches broad. The general use of it is well known. It is found in woods, old pastures, and by road-sides, and is in the greatest perfection in September. There is a variety of this with a yellowish white cap and white gills: this is very firm, but seldom expands so freely as the true sort, and when broiled will exude a yellowish juice. It is probable this sort is not pernicious, though it is always rejected by such as can distinguish it.

2. The pratenis, or champignon, is very common upon heaths and dry pastures. A number of them generally come up in a place, ranged in curved lines or circles. The cap is small, almost flat, from one to two or three inches diameter, of a pale buff colour, often crimped at the edges, and, when dry, tough like leather or a thin piece of fine cork. The gills are of the colour of the cap; are thinly placed; with a short one, and sometimes two, coming from the edge of the cap between each. The stalk or pillar is also of the colour of the cap; it is long, flender, and at the way of a thickness. This plant has but little smell; is rather dry; and yet, when broiled or fried, it communicates a good flavour. In perfection at the same time with the former.

3. The chantarellus, or chantarelle agaric, is rather a smaller fungus than the former. The cap is yellow, of different hues in different plants, some being of a pale yellow, and others of an orange colour. It is generally sunk in the middle, somewhat resembling a tunnel, and its edges are often twisted and contorted so as to form flounces or angles. The gills are of a deeper colour than the outside, are very fine, even, numerous, and beautifully branched. The ramifications begin at the stalk, and are variously extended towards the edge of the cap. The pillar is of the same colour as the cap, is seldom inflected in the centre, but rather sideways; it is flint, thickish at the root, and the gills mostly run down the top, which make it appear small in the middle. This plant broiled with salt and pepper has much the flavour of a roasted cockle; and is esteemed a delicacy by the French, as is the former. It is found in woods and high pastures, and is in perfection about the end of September.

4. The delicatiss, or orange agaric. The general size-
size of the cap of this species is from two to four inches broad. Its form is circular, with the edges bent inwards; convex on the upper surface, except in the centre, where it is a little depressed, so as nearly to resemble the apex of a smooth apple. The colour is a burnt yellow, streaked with ash and yellowish brown, from the centre to the edge, and when it is broken it emits a gold colour juice. The gills are of a deep yellow, and a few of them come out by pairs at the stalk, but divide immediately, and run straight to the edge of the cap. The stalk or pillar is thinnest near the middle, thickest at the root, and when cut transversely, it is quite white in the centre, with a fine yellow ring that goes to the edge. The fungus, well seasoned and then broiled, has the exact flavour of a roasted muscle. Its prime time is September, and it is to be found in high dry woods.

5. The cinnamomeus, or brown mushroom, has a cap the colour of fresh-tanned hides. At first it is hemispherical, firm, even, and fleshy, with motley a small Rising in the centre; but when old it is quite flat. The gills are of a yellowish brown, not very distant from each other, bent like a knee at the pillar, and have a short one or two runs from the edge of the cap between each. The pillar is near the length of a finger, firm, rather thick, brown at the base, of a forked yellow upward, and, when cut transversely, of a fine white grain. The cap in different plants is from two to five inches broad. The whole plant has a pleasant smell, and when broiled gives a good flavour. It is found in woods in September and October.

6. The violaceus, or violet mushroom. Its cap, when first expanded, is smooth, hemispherical, the main surface of a livid colour, but towards the margin it is of a better blue. When full grown or old, it becomes corrugated, and of a ruffly brown. The gills of a young plant are of a beautiful violet colour, and regularly placed. The pillar is of the colour of the gills, short, of a conical form, but swelled at the base into a sort of bulb. Its upper part is surmounted with an iron-coloured wool, which, in a plant just expanding, stretches across to the edge of the cap like a web. This species requires much broiling; but when sufficiently done and seasoned, it is as delicious as an oyster. It is found in woods in October. Hudson's bulbous is only a variety of this plant.

The above are the only species that can be safely recommended as edible: though there are some other sorts which are frequently eaten by the country people; and it is probable the greatest part of those with firm fleshy caps might be eaten with safety, provided they were chosen from dry grounds. It is well known that soil and situation have a great influence upon the properties of plants; and these being of a singular nature, and absolutely between that of an animal and vegetable, may be more powerfully affected than a complete species of either, by reason they have neither leaves nor branches to carry off the noxious damps and vapours of a stagnant soil, as a perfect vegetable has; nor have they any gros excremental discharges, like those of living animal. The gills must doubtly exude from their supravital moisture; but their situation is such, that any thick piece from the earth may lodge in them, and by clogging their excretory ducts, render the plants morbid. Thus they soon run into a state of putrefaction, and become a prey to worms, flies, and other insects. The common mushroom, which is in general clean (though we have several others better) is not safely eaten when produced upon a moist soil. Those who gather mushrooms for sale should therefore have particular regard to the lands they collect them from, especially if they know they are to be broiled; but if they are intended for catchup, perhaps they may be less cautious, as the salt and spices with which the juice is boiled may correct any evil disposition in the plants. But, even in this case, catchup made of mushrooms taken from a dry soil has a more aromatic and pleasant flavour than that which is made of those taken from a moist one, and it will always keep a great deal better.

Of the poisonous sorts, the two following are the most singular:

7. The mufcarius, or reddish mushroom, has a large hat, almost flat, either white, red, or crimson, sometimes better with angular red warts; the gills are white, flat, and inflexibly spear-shaped; the pillar is hollow, the cap fixed to the middle of the pillar, limber, and hanging down. This species grows in pastures, and is said to destroy bugs effectually if the juice is rubbed upon the walls and bed-posts. The inhabitants of the north of Europe, whose houses are greatly inhabited by bugs, eat this mushroom, and the flies upon tasting the leaf drop are instantly poisoned. An infusion of common peppermint in milk answers the same purpose; but the flies through time become wise enough not to taste it; and though vast numbers are at first destroyed, it is impossible to clear a house of these insects by this means. This is the moucho-more of the Russians, Kamtschadales, and Koraics, who use it as an instrument of intoxication. They sometimes eat it dry, sometimes immersed in a fermented liquor made with the epilobium, which they drink notwithstanding the dreadful effects. They are first feized with convulsions in all their limbs, then with a raging such as attends a burning fever. A few phantoms, gay or gloomy (according to their constitution), present themselves to their imaginations: some dance, others are seized with unspeakable pangs and phantoms, gay or gloomy (according to their constitution), present themselves to their imaginations: some dance, others are seized with unspeakable horrors. They perfonify this mushroom; and, if its effects urge them to suicide, or any dreadful crime, they say they obey its commands. To fit themselves for premeditated affinations, they take the moucho-more. Such is the fascination of drunkenness, among these people, that nothing can induce them to forbear this dreadful potion!

8. The glyceatos, or long-stalked mushroom, has an hemispherical hat tapering to a point, and clammy; the pillar is long, cylindrical, and white; the gills are white, and not concave, duffled with a fine powdery substance on each side; the root is bulbous, long, and hooked at the end. It is found in September, in woodlands and pastures. This species is thought to be poisonous; and we have the following account of the symptoms produced by eating it, in Dr Percival's Essays. "Robert Usherwood, of Middletown, near Manchester, a strong healthy man, aged 50 years, early in the morning gathered and eat what he fancied to be a mushroom. He felt no symptoms of indisposition, till five o'clock in the evening; when, being very thirsty, he drank near a quart of table-beer. Soon afterwards he became universally swollen, weak, and in great agonies. A severe vomiting and purging succeeded,
succeeded, with violent cramps in his legs and thighs, and discharged several pieces of the fungus, but with little or no violent pain or nausea. His pains and evacuations continued, almost without intermission, till the next night; when he fell into a found, and awoke in the morning perfectly easy, and free from complaint."

Many of the different species of this genus grow on cows or horses dung, on dunghills, on rotten wood, in cellars, or on the trunks of trees; of which the most remarkable is,

9. The quercinus, or agaric of the oak. This is of various sizes, sometimes not exceeding the bigness of the fist, sometimes as large as a man's head. It takes at least a year or two to grow to its full size. It is dark coloured, hard, heavy, and woody; it is sometimes used by the dyers, as an ingredient in the black dye. It is sometimes used as a food. It is remarkable is,

Cultures. Only the efulent kinds of mushrooms are cultivated; and the following method is used by the gardeners who raise them for sale.---If the young mushrooms cannot be procured from gardens, they must be looked for in rich pastures during the months of August and September: the ground must be opened about a foot thick, and put under cover to prevent wet getting to it. The spawn commonly appears in about two months after the mixture is made: but proportionally sooner the more effectually the air is excluded, provided the mixture is not kept so close as to heat. Old thatch, or litter which has lain long abroad so as not to ferment, is the best covering. The spawn has the appearance of white mould shooting out into long strings, by which it may be easily known wherever it is met with. The spawn is the best time to gather it, as some will appear, perhaps in a month after making; and when the beds are made in summer or winter, they are much longer before they produce. In any season, however, they ought not to be hastily destroyed; since mushroom-beds have been known to produce very plentifully, even after the spawn has lain in them five or six months. When the beds are destroyed, the spawn should be carefully preserved, and laid up in a dry place, at least five or six weeks before it is again planted.---The difficulty of managing mushroom-beds is, to keep them always in a proper degree of moisture. In the summer season they may be uncovered to receive gentle showers of rain at proper times; and in long dry seasons the beds should now and then be watered, but much wet ought by no means to be suffered to come to them. During the winter season they must be kept as dry as possible, and so closely covered as to keep out cold. In frosty, or very cold weather, if some warm litter, shaken out of a dung-heap, is laid on, the growth of the mushrooms will be promoted: but wetness in the bed, a covering of dry litter must be interposed; which should be renewed as it decays; and, as the cold increases, the covering must be thickened. By attending to these directions, plenty of mushrooms may be produced all the year round. For a peculiar, perhaps fabulous, method of producing mushrooms, see the article Lycurus.

Physicians have disputed much about the qualities of mushrooms; some considering them as a rich nourishment, and perfectly innocent, when properly chosen; and others affearing them to be extremely deleterious. Most of the fungi are indeed of a hurtful quality; and, with respect to the whole tribe, the efulent are very few. Efulent mushrooms are very nutritive; they are therefore a rich nourishment, and much akin to animal food; on which account they may be indulged in considerable quantity to strong persons. It requires, however, skill to distinguih this efulent kind; and very few, especially of those who are commonly employed to gather them, viz. the servants, have succeeded Culusius, or other authors who have been at the pains to distinguih them. Perhaps efulent mushrooms, if old, acquire a dangerous acrimony; and for these reasons Dr Cullen is of opinion that it is for the most part prudent to avoid them. In the warm climates they may be used as light food; but here it is preposterous to use them along with animal food, as they do not correct its alkaline tendency.
Agate.

AGATE or ACHAT, (among the Greeks and Latins, 

Agatés, and Achatés, from a river in Sicily, on the banks of which it was first found), a very extensive genus of the fienitic-gemmed gems.

These stones are variegated with veins and clouds, but have no zones like those of the onyx. They are composed of chrysolite debased by a large quantity of earth, and not formed, either by repeated injections round a central nucleus, or made up of plates laid evenly on one another; but are merely the effect of one simple concretion, and variegated only by the disposition given, by the fluid they were formed in, to their differently coloured veins or matters.

Agates are arranged according to the different colours of their ground. Of those with a white ground there are three species. (1.) The deudrachates, noosa 

fione, or aborescent agate. This seems to be the same with what some authors call the achates with rosemary in the middle, and others achates with little branches of black leaves. (2.) The dull, milky-looking agate. This, though greatly inferior to the former, is yet a very beautiful stone. It is common on the shores of rivers in the East Indies, and also in Germany and some other parts of Europe. Our lapidaries cut it into counters for card-playing, and other toys of small value. (3.) The lead-coloured agate, called the pho­

sniates by the ancients.

Of the agates with a reddish ground there are four species. (1.) An impure one of a flesh-coloured white, which is but of little beauty in comparison with other agates. The admixture of flesh-colour is but very slight; and it is often found without any clouds, veins, or other variegations; but sometimes it is prettily veined or variegated with spots of irregular figures, having limbed or ridged edges. It is found in Germany, Italy, and some other parts of Europe; and is wrought into toys of small value, and often into the German gun­

flints. It has been sometimes found with evident specimens of the perfect molles bedded deep in it. (2.) That of a pure blood colour, called hamschates, or the blood agate, by the ancients. (3.) The clouded and spotted agate, of a pale flesh colour, called by the ancients the carnelion agate, or sardachates. 4. The red-lead coloured one, variegated with yellow, called by the ancients the corall agate, or corala-achates, by the ancients.

Of the agates with a yellowish ground there are only two known species; the one of the colour of yellow wax, called cerachates by the ancients; the other a very elegant stone, of a yellow ground, variegated with white, black, and green, called the lemnos, and leontes for the ancients.

Lastly, Of the agates with a greenish ground, there is only one known species, called by the ancients juf­

baches.

Of all these species there are a great many varieties; some of them having upon them natural representations of men and different kinds of animals, &c. These representations are not confined to the agates whose ground is of any particular colour, but are occasionally found on all the different species. Velusius had in his custody a flesh-coloured agate on one side of which appeared a half-moon in great perfection, represented by a milky semicircle; on the other side, the phases of 

sopher, or the evening-star, whence he denominated it 
a phonolitan agate. An agate is mentioned by Kir­

cher *, on which was the representation of a heroine armed; and one in the church of St Mark in Venice has the representation of a king's head adorned with a diadem. On another, in the museum of the prince of Gonzaga, was represented the body of a man with the cloths in a running posture. A still more curi­

ous one is mentioned by de Boot †, wherein appears a De Gem. 

circle struck in brown, as exactly as if done with a pair of compasses, and in the middle of the circle the exact figure of a bishop with a mitre on: but inverting the stone a little, another figure appears; and if it is turned yet further, two others appear, the one of a man, and the other of a woman. But the most celebrated agate of this kind is that of Pyrrhus, wherein were represented the nine muses, each with their proper attributes, and Apollo in the middle playing on the harp ‡. In the emperor's cabinet is an oriental agate of a fur. It is very large, brilliantly formed, being fashioned into a cup, whose diameter is an ell, abating two inches. In the cavity is found delineated in black specks, B. XRISTIS. S. XXX. prizing bigness, being found in Egypt, whose dia­

meter is an ell, abating two inches. In the cavity is found delineated in black specks, B. XRISTOS. S. XXX. prizing bigness, being fashioned into a cup, whose dia­

meter is an ell, abating two inches. In the cavity is found delineated in black specks, B. XRISTOS. S. XXX. prizing bigness.

Great medicinal virtues were formerly attributed to the agate, such as resisting poisons, especially those of the viper, scorpion, and spider; but they are now very justly rejected from medicinal practice. The oriental ones are all said to be brought from the river Cambay. A mine of agates was some time ago discovered in Transylvania, of divers colours; and some of a large size, weighing several pounds.

Agates may be stained artificially with solution of silver in spirit of nitre, and afterwards exposing the part to the sun; and though these artificial colours disappear on laying the stone for a night in aquafortis, yet a knowledge of the practicability of thus staining agates, must render these curious figures abovementioned strongly suspected of being the work not of nature, but of art. Some account for these phenomena from natural causes. Thus, Kircher, who had seen a stone of this kind in which were depicted the four letters usually inscribed on crucifixes, I. N. R. I. apprehends that some real crucifix had been buried under-ground, among stones and other rubbish, where the inscription happening to be parted from the cross, and to be received among a soft mould or clay susceptible of the impression of the letters, came afterwards to be petrified. In the same manner he supposes the agate of Pyrrhus to have been formed. Others resolve much of the wonder into fancy, and suppose those stones formed in the same manner with the Cambiuneus or Flo­

rence stones.

The agate is used for making cups, rings, seals, handles for knives and forks, hilts for swords and hangers, beads to pray with, snuff-boxes, patch-boxes, &c. being cut or fawed with no great difficulty. At Paris, none have a right to deal in this commodity except the wholesale mercers and goldsmiths. The sword-cutters are allowed to sell it, but only when made into handles for courtse de châtel, and ready to set in. The cutters have the same privilege for their knives and forks.

Considerable quantities of these stones are still found near the river Achates in Sicily. There are found in some of these the surprising representations above-

men-
AGA [233] AGA

Leyden, 1594, in 4to; and in Paris at the king's printing-house, 1660, in folio.

AGATHO, a tragic and comic poet, disciple to Prodicas and Socrates, applauded in Plato's Dialogues for his virtue and beauty. His first tragedy obtained the prize; and he was crowned in the presence of upwards of 23,000 men, the 48th year of the Olympiad. There is nothing now extant of his, except a few quotations in Aristotle, Athenaeus, and others.

AGATHOCLES, the famous tyrant of Sicily, was son of a potter at Reggio. He was a thief, a common soldier, a centurion, a general, and a pirate, all in a regular succession. He defeated the Carthaginians several times in Sicily, and was once defeated himself. He first made himself tyrant of Syracuse, and then of all Sicily; after which, he vanquished the Carthaginians again both in Sicily and Africa. But at length having ill success, and being in arrears with his soldiers, they matrified, forced him to fly his camp, and cut off the throats of his children, whom he left behind. Recovering himself again, he relieved Corfou, besieged by Callander; burnt the Macedonian fleet; returned to Sicily; murdered the wives and children of those who had murdered his; afterwards meeting with the soldiers themselves, he put them all to the sword; and ravaging the sea-coast of Italy, took the city of Lipponium. He was at length poisoned by his grandson Arthagathas, in the 72d year of his age, 390 years before Christ, having reigned 28 years.

AGATHYRNA, or AGATHYRNUS, AGATHYRSA, or AGATHYRIS, (anc. geog.), a town of Sicily; now S. Marco; as old as the war of Troy, being built by Agathyrinus, son of Eolus, on an eminence. The gentilitious name is AGATHYRNEUS; or, according to the Roman idiom, AGATHYRNENS.

AGAVE, the common American aloe: A genus of the monogynia order, belonging to the hexandria clafs of plants; and in the natural method ranking under the toth order, Coronaria. The characters are: There is no calyx: The corolla is monopetalons and funnelf-shaped; the border six-parted, with lanced erect divisions: The flamia conflit of six erect filaments, longer than the corolla; the anthera are linear, shorter than the filaments, and ventrally: The pellitum is an oblong germen: The stylus is filiform, the length of the flamia, and triangular: the stigma headed and triangular: The pericarpium is an oblong triangular capsule, trilocular and three-valved: The seeds are numerous. Of this genus, botanical writers enumerate eight species.

Of the American, or great American aloe, the items generally rise upwards of 20 feet high, and branch out on every side towards the top, so as to form a kind of pyramid: the fider floors being garnished with greenish yellow flowers, which stand erect, and come out in thick clusters at every joint: these make a fine appearance, and continue long in beauty: a succession of new flowers being produced for near three months in favourable seasons, if the plant is protected from the autumnal colds. The seeds do not ripen in England. It has been generally thought, that these plants do not flower till they are 100 years old: but this is a mistake; for the time of their flowering depends on their growth: so that in hot countries, where they grow...
... yield her productions without culture; men held all things in common, and lived in perfect friendship. This period is supposed to have lasted till the expulsion of Saturn from his kingdom. The **flour age** commenced when men began to deviate from the paths of virtue; and in consequence of this deviation, their lives became less happy. The **brass age** commenced on a further deviation, and the **iron age** took place in consequence of one still greater. A late author, however, reflecting on the barbarism of the first ages, will have the order which the poets allign to the four ages inverted; the first being a time of rudeness and ignorance, more properly denominated an **iron age**. When cities and states were founded, the **flour age** commenced; and since arts and sciences, navigation and commerce, have been cultivated, the **golden age** has taken place.

In some ancient northern monuments, the **rocks** or **flying age** corresponds to the **brass age** of the Greeks. It is called **rocks** or the rock age, on account of Mount Ararat, which reeled on Mount Ararat; whereas men were said to be defended or sprung from mountains; or from Sceva, and Pyyhia restoring the race of mankind, by throwing stones over their heads. The northern poets also style the fourth age of the world the **after age**, from a Greek king Madesis, or Mannas, who on account of his great strength was said to be made ifi, or because in his time people began to make use of weapons made of that wood.

Among the Jews, the duration of the world is also divided into three ages. 1. The **first age**, or the **first** age, was the space of time from the creation to Moses. 2. The **present age**, denotes the whole space of time from Moses to the coming of the Messiah; and 3. The **age to come**, denotes the time from the coming of the Messiah to the end of the world.

Various other divisions of the duration of the world into ages have been made by historians—the Sibylline oracles, wrote, according to some, by the Jews acquainted with the prophecies of the Old Testament, divide the duration of the world into ten ages; and according to Josephus, each age contained 870 years. It appears, by Virgil's fourth eclogue, and other testamities, that the age of Augustus was repited the end of those ten ages, consequently as the period of the world's duration.

By some, the space of time commencing from Constantinople, and ending with the taking of Constantinople by the Turks in the 15th century, is called the **middle age**; but others choose rather to date the middle age from the division of the empire made by Theodosius at the close of the 4th century, and extend it to the time of the emperor Maximilian I. in the beginning of the 16th century, when the empire was first divided into circle. —The **middle** is by some denoted the **barbarous age**, and the latter part of it the **lame** age. Some divide it into the **non-academic** and **academic** ages. The first includes the space of time from the 6th to the 9th centuries, during which schools or academies were lost in Europe. The second from the 9th century, when schools were restored, and universities established, chiefly by the care of Charlemagne.

The several ages of the world may be reduced to three grand epochs, viz. the **age** of the law of nature, called by...
AGÉ

by the Jews the "age" of from Adam to Moses; the
age of the Jews, from Moses to Christ; and
the age of grace, from Christ to the present year.

Age is also frequently used in the same sense with
century, to denominate a duration of 100 years.

Age likewise signifies a certain period of the
duration of human life, by some divided into four stages,
namely, infancy, youth, manhood, and old age; the
first extending to the 14th year, the second to the 25th,
the third to the 56th, and the fourth to the end of life;
by others divided into infancy, childhood, youth,
manhood, and old age.

Age, in law, signifies a certain period of life, when
persons of both sexes are enabled to do certain acts.
Thus, one at twelve years of age ought to take the
oath of allegiance to the king in a lease; at fourteen
he may marry, choose his guardian, and claim his lands
held in socage. Twenty-one is called full age, a man
or woman being then capable of acting for themselves,
of managing their affairs, making contracts, disposing
of their estates, and the like.

Age of Trees. Thence after a certain age wagers.
An oak at a hundred years old ceases to grow. The
usual rule for judging of the age of wood, is by the
number of circles which appear in the
trunk or
arm, which was kept
about
three
years,
and one of gold,
and the
enlargement of a year: though some
suppose the growth of a year: though it is supposed the growth of a year: though some reject
this method as precarious, alleging that a simple cir-
cle is sometimes the produce of several years: besides,
that, after a certain age, no new circles are formed.

Age-prior, in law, is when an action being brought
against a person under age, for lands defended to him,
he, by motion or petition, shows the matter to the
court, praying the action may be set aside till his full age,
which the court generally agrees to.

AGELNOTH, Egelnoth, or Ethelnoth, in
Latin Adelnothus, archbishop of Canterbury,
in the
reign of Canute the Great, succeeded Livinging in
that year 1020. This prelate famed the Good,
was the son of Agilmer, and, at the time of his election,
dean of Canterbury. After his promotion he
went to Rome, and received his pall from Pope Bene-
dict VIII. In his way thither, as he passed through
Pavia, he purchased for an hundred talents of silver
and one of gold, St Augulfin's arm, which was kept
there as a reliquary; and sent it over to England as a pre-
fetant to Leofric earl of Coventry. Upon his return, he
is said to have raised the fee of Canterbury to its for-
mer lustre. He was much in favour with King Can-
ute, and employed his interest with that monarch to
good purposes. It was by his advice the king lent
over large sums of money for the support of the foreign
churches; and Malmesbury observes, that this prince
was prompted to acts of piety, and restrained from ex-
cesses, by the regard he had for the archbishop. Agel-
noth, after he had had 17 years in the fee of Can-
terbury, departed this life the 29th of October, 1038,
and was succeeded by Eadulf, king Harold's chap-
lain.—This archbishop was an author, having written,
1. A Panegyric on the blessed Virgin Mary. 2. A
Letter to Earl Leofric concerning St Augulfin. 3.
Letters to several persons.

AGEMA, in Macedonian antiquity, was a body of
soldiery, not unlike the Roman legion.

AGENOGLANS, Acanoglans, or Azo-
oglans, in the Turkish policy, are children purchased
from the Tartars, or raised every third
year, by way of
tribute, from the Christians tolerated in the Turkish
empire. Thence, after being circumcised and instructed
in the religion and language of the tyrannical masters,
are learnt the exercises of war, till they are of a pro-
er age for carrying arms, and from this corps the Ja-
inillaries are recruited. With regard to those who are
thought unfit for the army, they are employed in the
lowest offices of the seraglio. Their appointments are
very small, not exceeding seven or eight and a half
per day, which amount to about threepence-halfpenny
Sterling.

AGEN, a city of France, on the river Garonne,
the capital of Agenois in Guienne, and the see of a bishop.
The gates and old walls, which are yet remaining, show
that this city is very ancient, and that its former cir-
cuit was not so great as the present. The palace,
wherin the prebendal holds his fequisitions at this day, was
here before called the castle of Montravel, and is seated
without the walls of the old city, on the side of the
fole. There are likewise the ruins of another castle called La Sague, which was without the walls close
by a brook. Though the situation of Agen is very
convenient for trade and commerce, the inhabitants
are so very indolent that there is very little;
of which the neighbouring cities take the advantage. It is fea-
ed on the bank of the river Garonne, in a pleasant
country: but itself is a very mean and disagreeable place,
the houses being ill built, and the streets narrow, crook-
ed, and dirty. E. Long. o. 39. N. Lat. 44. 12.

AGENDA, among philosophers and divines, signi
fies the duties which a man lies under an obligation to
perform: thus, we meet with the agenda of a Chri
tian, or the duties he ought to perform, in opposition
to the eredenda, or things he is to believe.

AGENDA, among merchants, a term sometimes used
for a memorandum-book, in which is set down all the
busineses to be transacted during the day, either at
home or abroad.

AGENDA, among ecclesiastical writers denote the
service or office of the church. We meet with agenda
maturina & vesperiuna, morning and evening pray-
ers; agenda diei, "the office of the day;" whether
fast or fast day; agenda mortuorum, called also simply
agenda, "the service of the dead."

AGENDA is also applied to certain church-books,
compiled by public authority, prescribing the order
and manner to be observed by the ministers and peo-
ple in the principal ceremonies and devotions of the
church. In which sense, agenda amounts to the fame
with what is otherwise called ritual, liturgy, aca
lithia, missal, formular, directory, &c.

AGENHINE, in old writers, signifies a guest
that has lodged at an inn for three nights, after
which time he was accounted one of the family; and if
he offended the king's peace, his host was answer-
able for him. It is also written Hogenhine and
Hogenhynse.

AGENORIA, in mythology, the goddess of con-
rage and industry, as Venera was of indolence.

AGENT, in a general sense, denotes any active
power or cause. Agents are either natural or moral.
Natural agents are such inanimate bodies as have a
power
power to act upon other bodies in a certain and determinate manner; as, gravity, fire, &c. Moral agents, on the contrary, are rational creatures, capable of regulating their actions by a certain rule.

Agent, is also used to denote a person intrusted with the management of an affair, whether belonging to a society, company, or private person.

Agents in rebus, one of the ranks of officers in the court of the Constantinopolitan emperors, whose business was to collect and convey the corn both for the army and household; to carry letters and messages from court to all parts of the empire; to regulate courts, and their vehicles; to make frequent journeys and expeditions through the provinces, in order to inspect any motions, disturbances, or machinations tending that way, and to give early notice thereof to the emperor.

The agents in rebus, are by some made synonymous with our post-masters, but their functions were of great extent. They correspond to what the Greeks called ἀρχηγοί, and the Latins perpenduli. There were various orders or degrees of agents in rebus; as, tribuni, primicerii, senatoris, duumviri, biarchi, circitores, equites, tyranni, &c. through all which they rose gradatim. Their chief, who resided at Constantinople, was denominated princeps; which was a poilt of great dignity, being reckoned on a level with that of proconsul. They were settled in every part of the empire; and are also said to have served as interpreters.

Agent, in Roman antiquity, a certain portion of land allowed to each citizen. See Agrarian Law.

Ager Picinus, or Picenum, (anc. geog.) a territory of Italy to the south-east of Umbria, reaching from the Apennine to the Adriatic. The people are called Picentes (Cicero, Livy), distinited from the Picenians on the Tuscan seas, though called by Greek writers Πικενοι. This name is said to be from the bird Picus, under whose conduct they removed from the Sabines, of whom they were a colony.

Ageratium, bastard hemp, agrimony; a genus of the polygama equalis order, belonging to the fynegena class of plants; and in the natural method ranking under the 49th order, Compositae diffidi. The characters are: The common calyx is oblong, with many scales. The compound corolla is uniform; the corollas hermaphroditic, tubular and numerous; the proper corolla is funnel-shaped; the border 4-cleft, and expanded. The fruticos conflit of 5 capillary very short filaments; the anthera is cylindric and tubular. The pistillum is an oblong germin, with a filiform stylus, and two slender erect ilacmata. There is no pericarpium; the calyx unchanged. The seeds are solitary, oblong, and angular. The receptaculum is naked, convex, and very small. Of this genus there are three species; the conyzaoides, the hounionanum, and the altissimum. All these are natives of warm climates. The two first are annual plants, and consequently can be propagated only by seeds; which, however, come to perfection in England. The third species will bear the feverest cold of Britain, but its seeds do not ripen in it.

Ageratum, of Maudlin. See Achillea.

Agesilaus, king of the Lacedaemonians, the son of Archidamus, was raised to the throne notwithstanding the superior claim of Leotychides. As soon as he came to the throne, he advised the Lacedaemonians to be beforehand with the king of Persia, who was making great preparations for war, and to attack him in his own dominions. He was himself chosen for this expedition; and gained so many advantages over the enemy, that if the league which the Athenians and the Thesbians formed against the Lacedaemonians had not obliged him to return home, he would have carried his victorious arms into the very heart of the Persian empire. He gave up, however, all these triumphs readily, to come to the face of his country, which he happily relieved by his victory over the allies in Boeotia. He obtained another near Corinth; but to his great mortification, the Thesbians afterwards gained several over the Lacedaemonians. These misfortunes at first raised somewhat of a clamour against him. He had been tick during the first advantages which the enemy gained; but as soon as he was able to act in person, by his valour and prudence he prevented the Thesbians from reaping the advantages of their victories; insomuch that it was generally believed, had he been in health at the beginning, the Lacedaemonians would have sustained no losses, and that all would have been lost had it not been for his assistance. It cannot be denied but he loved war more than the interest of his country required; for if he could have lived in peace, he had saved the Lacedaemonians several losses, and they would not have been engaged in many enterprises which in the end contributed much to weaken their power. He died in the third year of the 104th Olympiad, being in the 83rd year of his age, and 41st year of his reign. Agesilaus would never suffer any picture or sculpture to be made of him, and prohibited it also by his will: this is supposable to have been a consequence of his own deformity; for he was of a short stature, and lame of one foot, so that strangers used to despise him at first sight. His fame went before him into Egypt, and there they had formed the highest idea of Agesilaus. When he landed in that country, the people ran in crowds to see him; but great was their surprise when they saw an ill-dressed, shaven, mean-looking little fellow lying upon the graft; they could not forbear laughing, and applied to him the fable of the mountain in labour. He was, however, the first to jest upon his own person; and such was the gaiety of his temper, and the strength with which he bore the roughness of exercise, that these qualities made amends for his corporal defects. He was extremely remarkable for plainness and frugality of his dress and way of living. "This (says Cornelius Nepos) is especially to be admired in Agesilaus; when very great pretences were sent him by kings, governors, and states, he never brought any of them to his own house; he changed nothing of the diet, nothing of the apparel of the Lacedaemonians. He was contented with the same house in which Euriphienes the founder of his family had lived; and whoever entered there, could see no sign of debauchery, none of luxury, but on the contrary, many of moderation and abstinence; for it was furnished in such a manner, that it differed in nothing from that of any poor or private person." Upon his arrival in Egypt, all kind of provisions were sent to him; but he chose only the most common, leaving the perfumes, the confections, and all that was esteemed most delicious, to his servants. Agesilaus was extremely fond of his children, and would often amuse himself by joining
joining in their diversions: one day when he was surprised riding upon a dapple with them, he said to the person who had seen him in this posture, "Forbear talking of it till you are a father."

**AGG** or **AGGONNA**, a British settlement on the gold-coast of Guinea. It is situated under the meridian of London, in 6 degrees of N. Lat.

**AGGER**, in the ancient military art, a work of fortification used for the defence of towns, camps, &c. In which fence it is the same with what was otherwise called *collum*, and in interstices *aggerum*; and among the moderns *limes*, sometimes *caulicary*, *turræ* &c. The agger was usually a bank, or elevation of earth or other matter, bound and supported by timber; having sometimes turrets on the top, wherein the workmen, engineers, and soldiers were placed. It was also accompanied with a ditch, which served as its chief defence. The usual materials of which it was made were earth, earthworks, flacks, &c. and even trunks of trees, roped, &c. variously erected, and interwoven some in the figure of ovals; whence they were called *scellati axem*. Where these were wanting, stones, bricks, tiles, supplied the office: on some occasions, arms, utensils, pack-faddles, were thrown in to fill it up. We even read of aggers formed of the carcasses of the slain; sometimes of dead bones mixed with lime; and even with the heads of slaughtered citizens. For want of dead binding, or fold materials, aggers have sometimes tumbled down, with infinite mischief to the men. The barbarians used to carry on a work of this kind nearer and nearer towards the place, till at length they reached the very wall. The methods taken, on the other side, to defeat them, were by fire, especially if the agger were of wood; by sapping and undermining, it of earth; and, in some cases, by erecting a counter agger.

The height of the agger frequently equal to that of the wall of the place. Caesar tells us of one he made, that was 30 feet high and 330 feet broad. Besides the use of aggers before towns, the generals used to carry on a work of this kind nearer and nearer towards the place, till at length they reached the very wall. The methods taken, on the other side, to defeat them, were by fire, especially if the agger were of wood; by sapping and undermining, it of earth; and, in some cases, by erecting a counter agger.

There were vast aggers made in towns and places on the sea-side, fortified with towers, castles, &c. Those made by Caesar and Pompey at Brundium, are famous. Sometimes aggers were even built across arms of the sea, lakes, or morasses; as was done by Alexander before Tyre, and by M. Anthony and Cassius. The wall of Severn, in the north of England, may be considered as a grand agger, to which belong several lesser ones. See **SERVVS**, *Wall.*

**AGGER**, in ancient writers, likewise denotes the middle part of a military road, raised in a ridge, with a gentle slope on either side, to make a drain for the water, and keep the way dry.

The term is also used for the whole road, or military way. Where highways were to be made in low grounds, as between two hills, the Romans used to raise them above the adjacent land, so as to make them on a level with the hills. These banks they called *aggeres*. Berger mentions several in Gallia Belgica, which were thus raised ten, fifteen, or twenty feet above ground.

—They are sometimes also called *aggeres calcvati*; and now generally known by the name *causeway*.

**AGGERHUSYS**, a city of Norway, capital of the province of the same name. It is subject to Denmark, and situated in E. Long. 28° 37′ and N. Lat. 59° 30′.

**AGGERS-HERRED**, a district of Christland, and a disocese of Norway. It consists of three parochial places; namely, Agger, Lejre Barum, and Ager.

**AGGLUTINANTS**, in pharmacy, a general name for all medicines of a glutinous or viscid nature; which, by adhering to the solids, contribute greatly to repair their loss.

**AGGLUTINATION**, in a general sense, denotes the joining two or more things together, by means of a proper glue or cement.

**Agglutination**, among physicians, implies the action of uniting the parts of a body, separated by a wound, cut, &c. It is also applied to the action of such internal medicines as are of an agglutinating quality, and which, by giving a glutinous consistence to the animal-fluids, render them more proper for nourishing the body.

**AGGREGATE**, in a general sense, denotes the union of several things added together, or the collection of them into one whole. Thus, a house is an aggregate of stones, wood, mortar, &c. It differs from a mixed or compound, inasmuch as the union of these last is more intimate than between the parts of an aggregate.

**Aggregates**, in botany, is a term used to express those flowers, which are composed of parts or florets, so united by means either of the receptacle or calyx, that no one of them can be taken away without destroying the form of the whole. They are opposed to simple flowers, which have no such common part, and are usually divided into seven kinds, viz. the aggregate, properly so called, whose receptacle is dilated, and whose florets are supported by foot-flats; such as the blue daily, thrift, or sea-plants, &c.; the compound; the *umbellifer*; the *cymo*; the *amethyst*; the *glauca*; and the *bisculosa*.

**Aggregation**, in physics, a species of union whereby several things which have no natural dependence or connection with one another are collected together, so as in some sense to constitute one. Thus, a heap of sand, or a mass of ruins, are bodies by aggregation.

**AGHER,** a town of Ireland, which sends two members to parliament. It is situated in the southern part of Ulster, not far from Clogher.

**AGHRIM,** a town of Ireland, in the county of Wicklow, and province of Leinster, situated about 13 miles south west of Wicklow.

**Aghrim,** in Galway: a small village, distant about 21 miles from Dublin, and rendered memorable by a decisive battle fought there, and at Kilcombonon-hill, the 12th of July 1691, between general Ginkel and Monxfuir St Ruth, the commanders under king William III. and James II., when St Ruth, the general of the Irish army, with 7000 of his men, were slain; but of the English only 600. The victory was the more considerable, as the English army consisted of no more than 18,000 men; whereas the Irish were computed at 20,000 foot and 1000 horse and dragoons. They lost likewise nine pieces of brass cannon, all their ammunition,
AGI

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AGIDES, in the Turkish armies, a kind of pioneers employed in fortifying camps, smoothing roads, and the like offices.

AGILIT\Y, an aptitude of the several parts of the body to motion. — The improving of agility was one of the chief objects of the institution of games and exercises. The athletes made particular profession of the science of cultivating and improving agility. Agility of body is often fupposed peculiar to some people; yet it seems left owing to anything peculiar in their frame and structure, than to practice.

AGINCOURT, a village of the French Netherlands, situated in East Long. 2° 10' N. Lat. 50° 35'; famous on account of the victory obtained by Henry V. of England over the French, in 1415.

The army of Henry, after landing in France, was by various accidents reduced to 10,000 men, of whom not a few were sick, or slowly recovering from sickness; — they had to traverse a long tract of country, infested by exasperated enemies, from whom they were to procure provisions, lodgings, guides, intelligence, and every thing they wanted; — that country was defended by many strong towns, intersected by deep rivers, and guarded by an army of 100,000, or (according to some contemporary writers) 140,000 men.

Henry, undaunted by all these dangers and difficulties, departed from Harfleur, marching his army in three lines, with bodies of cavalry on the wings. He proceeded by very easy journeys, that he might not fatigue his troops, or discourage them by the appearance of a flight; observing the strictest discipline, and paying generously for every thing he received; which induced the country people to bring provisions to his camp, in spite of all the commands they had received to the contrary. To keep his men in spirits, and from repining, the king fared as ill as the meanest soldier, always appearing with a cheerful countenance, and addressing them in the most friendly and encouraging language. They arrived at the village of Agincourt, in the county of St. Pol, on the evening of October 24th; and there beheld the whole French army, at a small distance, directly in their route. The king took an attentive view of it from an eminence; and being fully convinced that it was impossible to proceed any further on his way to Calais without a battle, and equally impossible to return to Harfleur with so great an army in his rear, he resolved to hazard an action next morning, as the only means of preserving himself and his little army from destruction.

The English army lodged that night in the villages of Agincourt, Maisonneville, and some others; where they met with better accommodation than they had been accustomed to for some time past, and spent part of their time in mutual exhortations to fight bravely in the approaching battle. The king, overhearing some of his nobles expressing a wish that the many brave men who were idle in England were present to assist them, is said to have cried out—“No! I would not have one man more:—if we are defeated, we are too many— if it shall please God to give us the victory, as I trust he will, the smaller our number the greater our glory.” The moon happening to shint very bright,

Henry, with some of his best officers, carefully examined the ground, and pitched upon a field of battle, admirably calculated to preserve a small army from being surrounded by a great one. It was a gentle declivity from the village of Agincourt, of sufficient extent for his small army, defended on each side by hedges, trees, and brush-wood. Having placed guards and kindled fires on all sides, the king and his army betook themselves to rest; except such as were of a more ferocious turn of mind, and, considering that as the last night of their lives, spent it devotion.

The French, exulting in their numbers, confident of victory, and abounding in provisions, spent the night in noisy festivity, and in forming fanciful schemes about the disposal of their prisoners and their booty. It was in general resolved to put all the English to the sword, except the king and the chief nobility, who were to be taken prisoners for the sake of their ransom.

On the morning of Friday, the memorable 25th of October, A. D. 1415, the day of Crispin and Crispianus, the English and French armies were ranged in order of battle, each in three lines, with bodies of cavalry on each wing. The Constable D'Albert, who commanded the French army, fell into the snare that was laid for him, by drawing up his army in the narrow plain between the two woods. This deprived him, in a great measure, of the advantage he should have derived from the prodigious superiority of his numbers; obliged him to make his lines unnecessarily deep, about 30 men in file; to crowd his troops, particularly his cavalry, so close together, that they could hardly move or use their arms; and, in a word, was the chief cause of all the disasters that followed. The French, it is said, had a considerable number of cannon of different sizes in the field; but we do not hear that they did any execution, probably for want of room. The first line of the French army, which consisted of 8000 men-at-arms on foot mixed with 4000 archers, with 500 men-at-arms mounted on each wing, was commanded by the Constable D'Albert, the dukes of Orleans and Bourbon, and many other nobles; the dukes of Alençon, Brabant, and Bar, &c. conducted the second line; and the earls of Marle, Damartine, Fauconberg, &c. were at the head of the third line. The King of England employed various arts to supply his defect of numbers. He placed 200 of his best archers in ambush, in a low meadow, on the flank of the first line of the French. His own first line consisted wholly of archers, four in file; each of whom, besides his bow and arrows, had a battle-axe, a sword, and a stake pointed with iron at both ends, which he fixed before him in the ground, the point inclining outwards, to protect him from cavalry; which was a new invention, and had a happy effect. That he might not be incumbered, he dismissed all his prisoners, on their word of honour to surrender themselves at Calais, if he obtained the victory; and lodged all his baggage in the village of Agincourt, in his rear, under a slender guard. The command of the first line was, at his earnest request, committed to Edward duke of York, assisted by the lords Beaumont, Willoughby, and Fanhope; the second was conducted by the king, with his youngest brother Humphrey duke of Gloucester, the earls of Oxford, Marshal, and Suffolk; and the third was led by the duke
formed. the king, in shining armour, with a crown of gold and jewels on his helmet, mounted on a fine white horse, rode along them, and addressed each corps with a cheerful countenance and animating speeches. To inflame their resentment against their enemies, he told them, that the French had determined to cut off three fingers of the right hand of every prisoner; and to rout their love of honour, he declared, that every soldier in that army who behaved well, should from henceforth be deemed a gentleman, and be entitled to bear coat-armour.

When the two armies were drawn up in this manner, they stood a considerable time gazing at one another in solemn silence. But the king, dreading that the French would discover the danger of their situation and decline a battle, commanded the charge to be found, about ten o'clock in the forenoon. At that instant, the first line of the English kneeled down, and killed the ground; and then starting up, discharged a flight of arrows, which did great execution among the crowded ranks of the French. Immediately after, upon a signal being given, the archers in ambush arose, and discharged their arrows on the flank of the French line, and threw it into some disorder. The battle now became general, and raged with uncommon fury. The English archers, having expended all their arrows, threw away their bows, rushing forward, made dreadful havoc with their swords and battle-axes. The first line of the enemy was, by these means, defeated; its leaders being either killed or taken prisoners. The second line, commanded by the duke of Alençon, (who had made a vow either to kill or take the king of England, or to perish in the attempt), now advanced to the charge, and was encountered by the second line of the English, conducted by the king. This conflict was more close and furious than the former. The duke of Gloucester, wounded and unhorsed, was protected by his royal brother till he was carried off the field. The duke of Alençon forced his way to the king, and assailed him with great fury; but that prince brought him to the ground, where he was instantly dispatched. Discriminated by this disaster, the second line made no more resistance; and the third fled without striking a blow; yielding a complete and glorious victory to the English, after a violent struggle of three hours duration.

The king did not permit his men to pursue the fugitives to a great distance, but encouraged them to take as many prisoners as they could on or near the field; in which they were so successful, that, in a little time, their captives were more numerous than his soldiers. A great proportion of these prisoners were men of rank and fortune; for many of the French nobility being on foot, and loaded with their heavy armour, could not make their escape. Among these were the dukes of Orleans and Bourbon, the marshal Boucicaut, the counts D'Eu, Vendome, Richemont, and Harcourt, and 7000 barons, knights, and gentlemen. The French left dead on the field of battle, the countable D'Alberit, the three dukes of Alençon, Brabant, and Bar, the archbishop of Sens, one marshal, 13 earls, 92 barons, 1500 knights, and a far greater number of gentlemen, besides several thousands of common soldiers. Even the French historians acknowledge, that the loss of the English was inconsiderable: those of English contemporary writers who make it the greatest, affirm, that it did not exceed 100, and that the duke of York and the earl of Suffolk were the only great men who fell on that side in this memorable action.

AGIO, in commerce, is a term chiefly used in Holland, and at Venice, to signify the difference between the value of bulk-frock and the current coin. The agio in Holland is generally three or four per cent, and at Rome it is from 15 to 25 per cent, but at Venice the agio is fixed at 20 per cent.

AGIOSYMANDRUM, a wooden instrument used by the Greek and other churches, under the dominion of the Turks, to call together assemblies of the people. The agiosymandrum was introduced in the place of bells, which the Turks prohibited their Christian subjects the use of, lest they should make them subversive to feditious.

AGIS, king of Lacedaemon, was descended from Ageiolus II. in a right line. He projected the reformation of his kingdom, by the restoring of the laws of Lycurgus; but he fell under the weight of an enterprise that could not but be disagreeable to all those who had great possessions, and had been long accustomed to the tweets of a voluptuous life. Agis being in the flower of his age, and having a very refined sense of glory, practised the ancient discipline first in his own person; his clothes and his table were according to the manners of former times; which is so much the more to be admired, because Ageiiratra his mother and Archidama his grandmother had brought him up voluptuously. When he found his people's minds, he found the younger fort opposed his project less than those who had enjoyed a relaxation of discipline several years. The greatest difficulty was expected to arise from the women. They had at that time more credit than ever; for their power is never greater than when luxury is in fashion. Ageiolus's mother did not at all relish the proposed reformation. She must have lost her riches, which gave her a share in a thousand forts of intrigues; for she opposed the design at once, and treated it as a chimera. But her brother Ageiilus, whom Agis had engaged in his interests, knew how to manage her in such a manner that she promised to second the enterprise. She endeavoured to gain the women: but instead of suffering themselves to be persuaded, they applied to Leonidas the other king of Lacedaemon, and humbly besought him to frustrate the designs of his colleague. Leonidas durst not oppose it openly, for fear of irritating the people; to whom the reformation was agreeable, because they found their account in it. He contented himself with counterminating it by intrigues, and fowing suspicions as if Agis had aspired to tyranny, by pulling down the rich and raising the poor. Agis did not fail to propose his new laws to the senate, relating to the discharge of debts, and a new division of the lands. Leonidas, being supported by the rich, opposed this project so strongly, that there was one voice more against it than for it. He paid dear for his success in this affair. Lyfander, one of the Ephors, who had been the grand promoter of the reformation, called him to account; alleged the ecclesiastical signs; and put to death Cleombros, a prince of the royal blood and son-in-law to Leonidas, to make sure of the kingdom.
Agis. [240] Agis,

Kingdom. Leonidas being frightened at this took refuge in a temple, where his daughter, the wife of Cleombrotus, followed him. He was summoned: and because he did not appear, he was degraded of his dignity, which was conferred on Cleombrotus. He obtained leave to retire to Tegæa. The New Ephor had Lyfander and Mandroclidas tried for innovation; these persuaded the two kings to unite and turn out these Ephors. The thing was brought about; but not without a great uproar in the city. Ageislaus, one of the Ephors that succeeded those who were just turned out would have caused Leonidas to be killed on the way to Tegæa, if Agis had not sent him a strong guard. The reformation might then have been established, if Ageislaus had not found means to elude the good intentions of the two kings. Whist this was transacting, the Achalans asked alms; which was given them, and Agis had the command of the troops. It acquired a good deal of reputation in this campaign. At his return, he found his affairs so embroiled by the ill conduct of Ageislaus, that it was impossible for him to maintain himself. Leonidas was recalled to Lacedæmon; Agis retired into the city and Cleomenes into another. The wife of the latter beheld herself in such a manner that she became the admiration of every body. Leonidas was content with banishing his son-in-law; after which he applied himself entirely to the ruin of Agis. One of the Ephors, who had no mind to return what Agestratas had lent him, was the principal instrument of the misfortune of this family. Agis never went out of his sanctuary but to battle. One day, as he was returning from thence to the temple, he was seized by that Ephorus and carried to prison. Then he was brought to his trial and condemned to death, and delivered to the executioner. His mother and grandmother used all the intreaty and importunity imaginable, that, as he was king of Lacedæmon, he might at least be permitted to plead his cause before the people. But they were apprehensive his words would make too great an impression, and therefore they ordered him to be strangled that very hour. The Ephorus who was in debt to Agestratas permitted that princes to go into the prison; which he granted likewise to Agis’s grandmother; but he gave orders to strangle them one after another. Agestratas died in a manner that was extremely to her honour. The wife of Agis, who was a princess of great fortune and prudence, and one of the finest ladies in Greece, was forced away from her apartment by king Leonidas, and obliged to marry his son, who was then very young, and hardly fit for marriage.

Agistment, Agitage, or Agitation, in law, the taking in other people’s cattle to graze at so much per week. The term is peculiarly used for the taking cattle to feed in the king’s forests, as well as for the profits arising from that practice. It is also used, in a metaphorical sense, for any tax, burden, or change; thus, the tax levied for repairing the banks of Romney-marsh was called agistment.

Agistor, or Agistator, an officer belonging to forests, who has the care of cattle taken in to be grazed, and levies the moneys due on that account. They are generally called queft-takers or gift-takers, and are created by letters-patent. Each royal forest Agisthor has four agitators.

Agisymba (anc. geog.), a district of Libya Interior, according to Agathemus, situated to the south-west of the Ethiopæs Anthropophagi; the parallel passing through which, at 16° to the south of the equator, was the utmost extent of the knowledge of the ancients to the fourth (Ptolemy).

Agitation, the act of shaking a body, or toiling it backwards and forwards. Agitation, in physics, is often used for an interline commotion of the parts of a natural body. Fermentation and effervescence are attended with a brisk agitation of the particles.

Agitation is one of the chief causes or instruments of mixture: by the agitation of the parts of the blood and chyle, in their continual circulation, purification is in a good measure effected. Butter is made out of milk by the same means: in which operation, a separation is made of the oleous parts from the serum, and a conjunction of the pleas together. Digestion itself is only supposed to be an insensible kind of agitation.

Agitation is reputed one of the symptoms of inspiration. Petit informs us, that, in the last century, Pépin de there are in a church in Italy, for the space of a year, Sybilla, Li. a vapour of an extraordinary kind, which put all the people into trembling and agitations, and unless they got away betimes, set them a dancing, with strange contrejorions and gesticulations. This seems to verify what has been related of the temple of Delphi.

Agitation is also used in medicine for a species of exercice popularly called faining. Maurice prince of Orange found this method a relief against the severe pains of the gout and stone. Bartholine mentions fits of the toothach, deafness, &c. removed by vehement agitations of the body.

Agitator, in antiquity, a term sometimes used for a charioteer, especially those who drove in the circus at the curule games.

Agitators, in the English history, certain officers set up by the army in 1647, to take care of its interests. — Cromwell joined the agitators, only with a view to serve his own ends; which being once accomplished, he found means to get them abolished.

Aglaia, the name of the youngest of the three Graces, espoused to Vulcan.

Aglionby (John), an English divine, chaplain in ordinary to king James I. a man of universal learning, who had a very considerable hand in the translation of the New Testament appointed by king James I. in 1604.

Agmen, in antiquity, properly denotes a Roman army in march: in which sense, it stands contrastingly from aces, which denoted the army in battle array; though, on some occasions, we find the two words used indifferently for each other. The Roman armies, in their marches, were divided into primus agmen, answering to our vanguard; medium agmen, our main-battle; and posterior agmen, the rear-guard.

The order of their march was thus: After the first signal with the trumpets, &c. the tents were taken down, and the baggage packed up; at the second signal, the baggage was to be loaded on the horses and carriages; and at the third signal, they were to begin their march. First
AGNATE, in law, any male relation by the father's side.

AGNELE, an ancient French gold coin, first struck under the reign of St Louis, worth about twelve sous six deniers. The agnel is also called sometimes mouton d'or, and agnel d'or. The denomination is supposed to have arisen from the figure of a lamb, agnus, or sheep, struck on one side.

AGNO, a river of Naples, which, taking its rise in the mountainous parts of Terra di Lavoro, washes the town of Accra; and, falling between Capua and Averla, falls into the Mediterranean, about seven miles north of Pazzollu.

AGNOETIC (from αγνοετι, to be ignorant of,) in church-history, a sect of ancient heretics, who maintained that Christ, considered as to his human nature, was ignorant of certain things, and particularly of the time of the day of judgment. Eulogius, patriarch of Alexandria, ascribes this hereby to certain solitaries in the neighbourhood of Jerusalem, who built their opinion upon the text Mark xiii. 32. "Of that day and hour knoweth no man, no not the angels who are in heaven, neither the Son, but the Father only."—The fame pas sage was made use of by the Arians; and hence the orthodox divines of those days were induced to give various explanations thereof. Some allege, that our Saviour here had no regard to his divine nature, but only spoke of his human. Others understand it thus, That the knowledge of the day of judgment does not concern our Saviour considered in his quality of Messiah, but God only: which is the most natural solution.

AGNOMEN, in Roman antiquity, a kind of fourth or honorary name, given to a person on account of some extraordinary action, virtue, or other accomplishment. Thus the agnomen AFRICANUS was bestowed upon Publius Cornelius Scipio, on account of his great achievements in Africa.—The agnomen was the third or honorary name, given to a person on account of his achievements. Thus the agnomen CECROPE was the third name of the king of Macedon, Cecrops, who was supposed to have distributed the regular supply, by Colles and religious deriving considerable pecuniary advantage from selling these AGNUSES DEI to tame, and presenting them to others. The pope provides a regular supply, by consecrating once in seven years; they are distributed by the master of the wardrobe, and received by the cardinals and other prelates, with great reverence, in their caps and mitres.—The ceremony they pretend to derive from an ancient custom of the church, wherein part of the paschal taper consecrated on Holy Thursday was distributed among the people, to perfume their houses, fields, &c. in order to drive away evils, and to preserve them from forms and temptations. The AGNUSES DEI is forbidden to be brought into England under pain of incurring a premonition, 13 Eliz. cap. 2.

AGNUS DEI is also a popular name for that part of the mass wherein the priest, striking his breast three times, rehearse, with a loud voice, a prayer beginning with the words AGNUSES DEI.—The AGNUSES DEI is said to have been first brought into the ritual by pope Sergius.

AGNUS SYPHICUS. See SYPHIAN LAMB.

AGOGE, among ancient musicians, a species of modulation, where in the notes proceed by contiguous degrees.

AGON, among the ancients, implied any dispute or content, whether it had regard to bodily exercises or the accomplishments of the mind; and therefore poets, musicians, painters, &c. had their agonies, as well as the athletes. Games of this kind were celebrated at most of the heathen festivals; with great solemnity, either annually, or at certain periods of years. Among the latter were celebrated at Athens, the agon gymnicus, the agon nemeus instituted by the Argives in the 53d Olympiad, and the agon olympius instituted by Heracles 430 years before the first Olympiad.—The Romans also, in imitation of the Greeks, instituted contests of this kind. The emperor Diocletian, after the death of one under the name of agon solus the contest of the fun; Diocletian another, which he called agon capitolinus, which was celebrated every fourth year, after the manner of the Olympic games. Hence the years, instead of juftra, are sometimes numbered by agonies.

AGON also signified one of the ministers employed in the Heathen sacrifices, and whose business it was to strike the victim. The name is supposed to have been derived from hence, that flapping ready to give the stroke he asked, Agon? or Agone? Shall I strike?

AGONALES, an epithet given to the salii.

AGONALIA, in Roman antiquity, festivals celebrated in honour of Janus, or the god Agonian, whom the Romans invoked before undertaking any affair of importance.

AGONALIS CIRCUS, now La Piazza Navona, a long, large, beautiful street in the heart of Rome, adorned with fountains, and the obelisk of Caracalla, still retaining the form of that circus. The reason of the name Agonalis is either unknown or doubtful. Ovid seems to derive it from the agones, or solemn games,
AGONIUM, in Roman antiquity, was used for the day on which the red facrorum sacrificed a victim, as well as for the place where the games were celebrated, otherwise called agon.

AGONOTHETAE, or AGONOTHESES, in Grecian antiquity, was the president or superintendent of the sacred games; who not only defrayed the expense attending them, but inspected the manners and discipline of the athletes, and adjudged the prizes to the victors.

AGONY, any extreme pain. It is also used for the pangs of death. Much of the terror of death consists in the pangs and convulsions wherewith the agony is attended; though we have reason to believe that the pain in such cases is ordinarily not extremely acute; a course of pain and sickness having usually stupified and indispersed the nerves for any quick sensations.

However, various means have been thought of for mitigating the agony of death. Lord Bacon considers this as part of the province of a physician; and that not only when such a mitigation may tend to a recovery, but also when, there being no further hopes of a recovery, it can only tend to make the passage out of life more calm and easy. Complacency in death, which Augustus so much desired, is certainly no small part of happiness. Accordingly the author last cited ranks eubenasia, or the art of dying easily, among the disdainers of science; and does not even seem to disapprove of the course Epicurus took for that end.

---Hinc fxyias ebrios hast aquas.

Opium has been applied for this purpose, with the applause of some, but the condemnation of more.

AGONYCLITAE, or AGONYCLITAE, in church-history, a sect of Christians, in the 7th century, who professed always standing, as thinking it unlawful to kneel.

AGORÆUS, in heathen antiquity, an appellation given to such deities as had statues in the market-place; particularly Mercury, whose statue was to be seen in almost every public place.

AGORANOMUS, in Grecian antiquity, a magistrate of Athens, who had the regulation of weights and measures, the prices of provisions, &c.—The agora, at Athens, were ten in number; five belonging to the city, and as many to the pirates; though others make them fifteen in all, of whom they allotted ten to the city. To these a certain toll or tribute was paid, by all who brought anything to sell in the market.

AGOUTI, or AGOUT. See Mus.

AGRA, the capital town of a province of the same name, in Indostan, and in the dominions of the Great Mogul. It is looked upon as the largest city in these parts, and is in the form of a half-moon. A man on horseback can hardly ride round it in a day. It is surrounded with a wall of red stone, and with a ditch 100 feet wide. The palace is prodigiously large, and the seraglio commonly contains above 1000 women. There are upwards of 800 baths in this town; but that which travellers most admire, is the mausoleum of one of the Mogul's wives, which was 20 years in building. The indigo of Agra is the most valuable of all that comes from the East Indies. This town is seated on the river Jumna, about 50 miles above its confluence with the Teshum, and is 300 miles N. E. of Surat. E. Long. 79. 12. N. Lat. 26. 29.

AGRARIAN LAWS, among the Romans, those relating to the division and cistiruption of lands, of which there were a great number; but that called the Agrarian Law, by way of eminence, was published by Spurrus Calvis, about the year of Rome 268, for dividing the conquered lands equally among all the citizens, and limiting the number of acres which each citizen might enjoy. The Roman lands were of several kinds; some conquered from the enemies, and not yet brought to the public account; others brought indeed to the public, but clandestinely usurped by private great men; lastly, others purchased with the public money, in order to be divided. Agrarian laws, either for dividing lands taken from the enemy, or the public lands, or those purchased with the public money, were easily padded with disturbance; but those whereby private rich men were to be deprived of their lands, and the common people put in possession of what had been held by the nobility, were never attempted without great discontents.

Several laws were for the necessity of agrarian laws in England: but an act has entered to deeply into the subject as Mr. Harrington in his Oceana, which the reader who chooses may consult.

AGREDÀ, a town of Spain, in Old Castile, near the frontiers of Aragon, and about three leagues south-west of Taragon.

AGRIA, called by the Germans Egria, is a small but strong town in Upper Hungary, and is a bishop's see. It is situated on a river of the same name, and has a castle called Erav. It was besieged by the Turks in 1552, with 70,000 men; but they left 8000 in one day; and were obliged to raise the siege, though their garrison consisted only of 2000 Hungarians, affiduated by the women, who performed wonders on this occasion. However, it was afterwards taken by Mats'omet III. in 1566; but was taken by the emperor in 1587; since which time it has continued under the dominion of the house of Austria. It is 47 miles north-east of Buda, and 55 south-west of Caslovia. E. Long. 20. 10. N. Lat. 48. 10.

AGRICOLA, (Cnemus Junius), born at Frejus in Pro-
Agricola. Provence, was, in Vespasian's time, made lieutenant to Vettius Bolanus in Britain; and, upon his return, was ranked by that emperor among the patricians, and made governor of Aquitania. This post he held three years; and upon his return he was chosen consul, and afterwards appointed governor of Britain, where he greatly distinguished himself. He reformed many abuses occasioned by the avarice or negligence of former governors, put a stop to extortion, and caused justice to be impartially administered. Vespasian dying about this time, his son Titus, knowing the great merit of Agricola, continued him in the government. In the spring, he marched towards the north, where he made some new conquests, and ordered forts to be built for the Romans to winter in. He spent the following winter in concerting schemes to bring the Britons to conform to the Roman customs. He thought the best way of diverting them from rising and taking arms, was to soften their rough manners, by proposing to them new kinds of pleasure, and insipring them with a desire of imitating the Roman manners. Soon after this, the country was adorned with magnificent temples, porticos, baths, and many other fine buildings. The British nobles had at length their sons educated in learning; and they who before had the utmost aversion to the Roman language, now began to study it with great avidity; they wore likewise the Roman habit; and, as Tacitus observes, they were brought to consider those things as marks of politeness, which were only so many badges of slavery. Agricola, in his third campaign, advanced as far as the Tweed; and in his fourth, he subdued the nations betwixt the Tweed and the friths of Edinburgh and Dumbarton, into which the rivers Glotta and Bodotria discharge themselves; and here he built fortresses to shut up the nations yet unconquered. In his fifth, he marched beyond the friths; where he made some new acquisitions, and fixed garrisons along the western coasts, over against Ireland. In his sixth campaign he passed the river Bodotria, ordering his fleet, the first which the Romans ever had in those parts, to row along the coasts, and take a view of the northern parts. In the following spring, the Britains raised an army of 30,000 men; and the command was given to Galgacus, who, according to Tacitus, made an excellent speech to his countrymen on this occasion. Agricola likewise addressed his men in very strong and eloquent terms. The Romans gained the victory, and 10,000 of the Britains are said to have been killed. This happened in the reign of the emperor Domitian; who, growing jealous of the glory of Agricola, recalled him, under pretence of making him governor of Syria. Agricola died soon after; and his death is suspected to have been occasioned by poison given him by that emperor. Tacitus the historian married his daughter, wrote his life, and laments his death in the most pathetic manner.

Agriculture

Definition. May be defined, The art of disposing the earth in such a manner as to produce whatever vegetables we desire, in large quantity, and in the greatest perfection of which their natures are capable. — But though by this definition, agriculture, strictly speaking, includes in it the cultivation of every species of vegetable whatever, and consequently comprehends all that is understood gardening and planting, we mean here to con-
agriculture.

History. The antiquity of this art is undoubtedly beyond that of all others; for we are informed by Scripture, that Adam was sent from the garden of Eden to till the ground; and, this being the case, he certainly must have known how to do so.—It would be ridiculous, however, to imagine that he was acquainted with all the methods of ploughing, harrowing, sowing, &c. which are now made use of; and it would be equally so to suppose, that he used such clumsy and unartful instruments as wooden hooks, horns of oxen, &c. to dig the ground, which were afterwards employed for this purpose by certain savages: but as we know nothing of the particular circumstances in which he was situated, we can know as little concerning his method of agriculture.

The prodigious length of life which the antediluvians enjoyed, must have been very favourable to the advancement of arts and sciences, especially agriculture, to which it behoved them to apply themselves in a particular manner, in order to procure their subsistence. It is probable, therefore, that even in the antediluvian world, arts and sciences had made great progress, nay, might be farther advanced in some respects than they are at present. Of this, however, we can form no judgment, as there are no histories of those times, and the scripture gives us but very slight hints concerning these matters.

No doubt, by the terrible catastrophe of the flood, which overwhelmed the whole world, many sciences would be entirely lost, and agriculture would suffer; as it was impossible that Noah or his children could put in practice, or perhaps know, all the different methods of cultivating the ground that were formerly used. The common methods, however, we cannot but suppose to have been known to him and his children, and by them transmitted to their posterity: so that as long as mankind continued in one body, agriculture, when it was carried so far, as to be the amusement of different nations, the arts, agriculture especially, would necessarily advance; and that they did so, is evident from the undertaking of the tower of Babel. It is from the dispersion of mankind consequent upon the confusion of tongues, that we must date the origin of savage nations. In all societies where different arts are cultivated, there are some persons who have a kind of general knowledge of most of those practised through the whole society, while others are in a manner ignorant of every one of them. If we suppose a few people of understanding to separate from the rest, and become the founders of a nation, it will probably be a civilized one, and the arts will begin to flourish from this origin; but, if a nation is founded by others whose intellects are in a manner callous to every human science (and of this kind there are many in the most learned countries), the little knowledge or memory of arts that were among the original founders will be lost, and such a people will continue in a state of barbarism for many ages, unless the arts be brought to them from other nations.

From this, or similar causes, all nations of equal antiquity have not been equally savage, nor is there any solid reason for concluding that all nations were originally unskilled in agriculture; though as we know not the original instruments of husbandry used by mankind when living in one society, we cannot fix the date of the improvements in this art. Different nations have always been in a different state of civilization; and agriculture, as well as other arts, has always been in different degrees of improvement among different nations at the same time.

From the earliest accounts of the eastern nations, we have reason to think, that agriculture has at all times been underfoot by them in considerable perfection; seeing they were always supplied not only with the necessaries, but the greatest luxuries of life.

As soon as the descendants of Abraham were settled in Palestine, they generally became husbandmen, from the chiefs of the tribe of Judah to the lowest branch of the family of Benjamin. High birth or rank did not at that time make any distinction, for agriculture was considered as the most honourable of all employments; witness the illustrious examples of Gideon, Saul, and David.

The Chaldeans, who inhabited the country where agriculture had its birth, carried that valuable art to a degree of excellence unknown in former times. They cultivated their lands with great affiduity, and seem to have found out some means of restoring fertility to an exhausted soil, by having plentiful harvests in succession; on which account they were not obliged, as their predecessors had been, to change their situations, in order to obtain a sufficiency for themselves and their numerous flocks and herds.

The Egyptians, who, from the natural fertility of their country by the overflowing of the Nile, raised every year vast quantities of corn, were so familiar of the blessings resulting from agriculture, that they ascribed the invention of that art to Osiris. They also regarded Isis, their second deity, as the discoverer of the use of wheat and barley, which before grew wild in the fields, and were not applied by that people to the purposes of food. Their superstitious gratitude was shown so far as to worship those animals which were employed in tillage; and even to the produce of their lands, as leeks, onions, &c.

The divine honours paid to Bacchus in India were derived from the same source, he being considered in that country as the inventor of planting vineyards, and the other arts attendant upon agriculture.

It is also related of the ancient Persians, on the most respectable authority, that their kings laid aside their grandeur once every month to eat with husbandmen. This is a striking instance of the high estimation in which they held agriculture; for at that time arts were practised among that people in great perfection, particularly those of weaving, and embroidery. The precepts of the religion taught by their ancient magi, or prêcis, included the practice of agriculture.

The Jews, among them was obliged to work out his salvation by pursuing all the labours of agriculture: And it was a maxim of the Zendavesta, that he who sows the ground with care and diligence, acquires a greater degree of religious merit, than he could have gained by the repetition of ten thousand prayers.

The Phoenicians, so well known in scripture by the name of Philistines, were also remarkable for the attention to, and skill in agriculture. But finding themselves
Agriculture.

History.

Itself too much disturbed and confined by the incursions and conquests of the Israelites, they spread themselves throughout the greatest part of the Mediterranean islands, and carried with them their knowledge in the arts of cultivation.

Mago, a famous general of the Carthaginians, is said to have written no less than 28 books on the subject; which Columella tells us were translated into Latin by the express order of the Roman Senate. We are informed by the ancient writers, that Ceres was born in Sicily, where she first invented the arts of tillage and of sowing corn. For the essential service, she was, agreeably to the superstition of those ages, deified, and worshipped as the goddess of plenty. The truth of this is, that in the time of Ceres, the island, through her endeavours and the industry of the people, became very fruitful in corn; and agriculture was there esteemed a honourable employment, that even their kings did not disdain to practise it with their own hands.

But time, which at first gave birth to arts, often caused them to be forgotten when they were removed from the place of their origin. The descendants of Noah, who settled in Europe, doubled carried their knowledge of agriculture with them into the regions which they successively occupied. But those who took possession of Greece were such an uncivilized race, that they fed on roots, herbs, and acorns, after the manner of beasts. Pelagus had taught them the culture of the oak, and the use of acorns as food; for which service, we are told, divine honours were paid him by the people.

The Athenians, who were the first people that acquired any tincture of polite arts, taught the use of corn to the rest of the Greeks. They also instructed them how to cultivate the ground, and to prepare it for the reception of the seed. This art we are told, was taught them by Trippolemus. The Greeks soon perceived that bread was more wholesome, and its taste more delicate than that of acorns and the wild roots of the fields; accordingly they thanked the gods for such an unexpected and beneficial present, and honoured the benefactor.

As the arts of cultivation increased, and the blessings they afforded became generally experienced, the people soon preferred them to whatever the ravages of conquest, and the cruel depredations of savage life, could procure. And accordingly we find, that the Athenian kings, thinking it more glorious to govern a small state fitly, than to aggrandize themselves, and enlarge the extent of their dominions by foreign conquests, withdrew their subjects from war, and mostly employed them in cultivating the earth. Thus, by continued application, they brought agriculture to a considerable degree of perfection, and soon reduced it to an art.

Hefiod was the first we know of among the Greeks who wrote on this interesting subject. According to the custom of the Oriental authors, he wrote in poetry, and embellished his poem with luxuriant descriptions and sublime imagery. He calls his poem Weeks and Days, because agriculture requires exact observations on times and seasons. Xenophon has also, in his Oeconomics, remarked, that agriculture is the nursing mother of the arts. For, says he, "where agriculture succeeds prosperously, there the arts thrive; but where the earth uselessly lies uncultivated, there the other arts are destroyed."

Other eminent Greek writers upon agriculture were, Democritus of Abdera, Socrates, Archytas, Tarentinus, Arisotle, and Theophrastus, from whom the art received considerable improvements.

The ancient Romans esteemed agriculture so honourable an employment, that the most illustrious senators of the empire, in the intervals of public concerns, applied themselves to this profession; and such was the simplicity of those ages, that they assumed no appearance of magnificence and splendor, or of majesty, but when they appeared in public. At their return from the toils of war, the taking of cities, and the subduing of hostile nations, their greatest generals were impatient till they were again employed in the arts of cultivation.

Regulus, when in Africa, requested of the Senate to be recalled, left his farm might suffer, for want of proper cultivation, in his absence; and the Senate wrote him for answer, that it should be taken care of at the public expense, while he continued to lead their armies.

Cato the censor, after having governed extensive provinces, and subduing many warlike nations, did not think it below his dignity to write a Treatise on Agriculture. This work (as we are told by Servius) he dedicated to his own son, it being the first Latin treatise written on this important subject; and it has been handed down to us in all its purity, in the manner that Cato wrote it.

Varro composed a treatise on the same subject, and on a more regular plan. This work is embellished with all the Greek and Latin erudition of that learned author, who died 28 years before the commencement of the Christian era. Virgil, who lived about the same time, has, in his Georgics, adorned this subject with the language of the Muses, and finely illustrated the precepts and rules of husbandry left by Hesiod, Mago, and Varro.

Columella, who flourished in the reign of the emperor Claudius, wrote 12 books on husbandry, replete with important instruction.

From this period to that of the reign of Constantine Paganus, husbandry continued in a declining state; but that wise emperor caused a large collection of the most useful precepts relating to agriculture to be extracted from the best writers, and published them under the title of Georgics. It has been ascertained, that he made this collection with his own hand; and the truth of the assertion is not improbable, as it is well known, that after he had conquered the Saracens and the Arabians, he not only practised and encouraged, but studied the arts of peace, fixing his principal attention on agriculture, as their best foundation.

After the death of Constantine, however, the increasing attention of the people to commerce, and the ignorance and gross superstition of the ages which succeeded, seems to have rendered agriculture an almost neglected science. The irruptions of the northern nations soon abolished any improved system. These innumerable and enterprising barbarians, who over-ran all Europe, were originally shepherds or hunters, like the present Tartars and the savages of America. They esteemed themselves with possessing those vast deserts made by
by their own ravages, without labour or trouble, cultivating only a very small spot near their habitations; and in this trifling husbandry only the meaelst flaves were employed; so that the art itself, which formerly was thought worthy of the study of kings, was now looked upon as mean and ignoble; a prejudice which is scarcely effaced at present, or at least but very lately. — During this period, therefore, we find no vestiges of any thing tolerably written on the subject. None attempts were made to revive it, or to improve it, till the year 1478, when Cretienzone published an excellent performance on the subject at Florence. This roused the lumbering attention of his countrymen, several of whom soon followed his example. Among these, Tartti, Steffano Augustino Gallo, Sanovino, Lauro, and Tarello, deserve particular notice.

At what time agriculture was introduced into Britain, is uncertain. When Julius Caesar first invaded that island, it was not wholly unknown. That conqueror was of opinion, that agriculture was first introduced by some of those colonies from Gaul which had settled in the southern parts of Britain, about 100 years before the Roman invasion.

It is not to be expected that we can now be acquainted with many of the practices of these ancient husbandmen. It appears, however, that they were not unacquainted with the use of manures, particularly marle. This we have on the authority of Pliny, who tells us, that it was peculiar to the people of Gaul and of Britain; that its effects continued 80 years; and that no man was ever known to marle his field twice, &c. — It is highly probable, too, that time was at this time also used as a manure in Britain, it being certainly made use of in Gaul for this purpose at the time of Julius Caesar's invasion.

The establishment of the Romans in Britain produced great improvements in agriculture, inasmuch that prodigious quantities of corn were annually exported from the island; but when the Roman power began to decline, this, like all the other arts, declined also, and was totally destroyed by the depredations of the invader. The unhappy Britons were now exposed to frequent incursions of the Scots and Picts, who destroyed the fruits of their labours, and interrupted them in the exercise of their art. After the arrival of the Saxons in the year 449, they were involved in such long wars, and underwent so many calamities, that the husbandmen gradually lost much of their skill, and were at last driven from those parts of the country which were most proper for cultivation.

After the Britons retired into Wales, though it appears from the laws made relative to this art, that agriculture was thought worthy of the attention of the legislature, yet the instruments employed in the management thereof were unfruitful. It was enacted that no man should undertake to guide a plough who could not make one; and that the driver should make the ropes of twisted willows, with which it was drawn. It was usual for six or eight persons to form themselves into a society for fitting out one of these ploughs, providing it with oxen and every thing necessary for ploughing; and many minute and curious laws were made for the regulation of such societies. If any person laid dung on a field with the consent of the proprietor, he was by law allowed the use of that field for one year. If the dung was carried out in a cart, in great abundance, he was to have the use of the land for three years. Whoever cut down a wood, and converted the ground into arable, with the consent of the owner, was to have the use of it for five years. If any one folded his cattle, for one year, upon a piece of ground belonging to another, with the owner's consent, he was allowed the use of that field for four years.

Thus, though the Britons had in a great measure lost the knowledge of agriculture, they appear to have been very affiduous in giving encouragement to such as would attempt a revival of it; but, among the Anglo-Saxons, things were not at present in so good a state. These refractory and haughty warriors, having contracted a distant and contempt for agriculture, were at pains to enact laws to prevent its being followed by any other than women and slaves. When they first arrived in Britain, they had no occasion for this art, being supplied by the natives with all the necessaries of life. After the commencement of hostilities, the Saxons subsisted chiefly by plunder; but having driven out or exterminated most of the ancient Britons, and divided their lands among themselves, they found themselves in danger of starving, there being now no enemy to plunder; and therefore they were obliged to apply to agriculture.

The Saxon princes and great men, who, in the division of the lands, had received the greatest shares, are said to have subdivided their estates into two parts, which were called the in-lands and the out-lands. The in-lands were those which lay most contiguous to the manor-house of their owner, which he kept in his own possession, and cultivated by his slaves, under the direction of a bailiff, for the purpose of raising provisions for the family. The out-lands were those at a greater distance from the house, and were let to the cottars, or farmers of those times, at very moderate rents. By the laws of Ina king of the West Saxons, who reigned in the end of the seventh and beginning of the eighth century, a farm consisting of ten hides, or eight-ploughlands, was to pay the following rent: "Ten casks of honey; three hundred loaves of bread; twelve cauls of strong ale; thirty cauls of small ale; two oxen; ten wethers; ten geese; twenty hens; ten cheefes; one caulk of better; five salmon; twenty pounds of forage; and one hundred eels." From this low rent, the imperfection of agriculture at that time is easily discoverable: but it is still more so from the low prices at which land was then sold. In the ancient history of the church of Ely, published by Dr Gale, there are accounts of many purchases of lands by Adelin, the founder of that church, and by other benefactors, in the reign of Edgar the Peaceable, in the seventh century. By comparing these accounts, it appears, that the ordinary price of an acre of the best land in that part of England, in those times was no more than 16 Saxon pennies, or about four shillings sterling; a very trifling price, even in comparison with that of other commodities at the same time. For, by comparing other accounts, it appears, that four sheep were then equal in value to an acre of the best land, and one horse of the same value with three acres. The frequent and deplorable famines which afflicted England about this time, are further instances of the wretched state of agriculture. In 1043, a quarter of wheat sold for
from 60 Saxon pence (15 shillings sterling), and at that time equal in value to seven or eight pounds sterling at present.

The invasion of the Normans, in 1066, contributed very much to the improvement of agriculture; for, by that event, many thousands of husbandmen from Flanders, France, and Normandy, settled in Britain, obtained estates or farms, and cultivated them after the manner of their country. The implements of husbandry, used at this time, were of the same kind with those employed at present; but some of them were less perfect in their construction. The plough, for example, had but one flint or handle, which the ploughman guided with one hand, having in his other hand an instrument which served both for cleaning and mending the plough, as well as for breaking the clods. The Norman plough had two wheels; and in the light soil of Normandy was commonly drawn by one or two oxen; but, in England, a greater number was often required; their carts, harrows, scythes, sickles, and hoes, from the figures of them still remaining, appear to have been nearly of the same construction with those that are now used. In Wales, they did not use a flint for reaping their corn, but an instrument like the blade of a knife, with a wooden handle at each end.—Their chief manure, next to dung, seems still to have been marl. Summer following of lands designed for wheat, and ploughing them several times, appear to have been frequent practices of the English farmers in this period.

We are, after all, very much in the dark as to the state and progress of agriculture in Great Britain previous to the fourteenth century. That it was very generally practised, especially in the eastern, southern, and midland parts of England, is certain; but of the mode, and the success, we are left almost totally ignorant. In the latter end of the fifteenth century, however, it seems to have been cultivated as a science, and received very great improvement.

A. At this time in England Fitzherbert, Judge of the Common-Places, flourished with distinguished eminence in the practical parts of husbandry. He appears to have been the first Englishman who studied the nature of soils, and the laws of vegetation, with philosophical attention. On these he formed a theory confirmed by experiments, and rendered the study pleasing as well as profitable, by realizing the principles of the ancients, to the honour and advantage of his country. Accordingly, he published two treatises on this subject: the first, intitled The Book of Husbandry, appeared 1524; and the second, called The Book of Surveying and Improvements, in 1529. These books, being written at a time when philosophy and science were but just emerging from that gloom in which they had long been buried, were doubtless replete with many errors; but they contained the rudiments of true knowledge, and revived the study and love of art, the advantages of which were obvious to men of the least reflection. We therefore find that Fitzherbert's books on Agriculture soon raised a spirit of emulation in his countrymen, and many treatises of the same kind successively appeared, which time has however deprived us of, or at least have become so very scarce as to be found in the libraries of the curious.

About the year 1660, France made some considerable efforts to revive the arts of husbandry, as appears from several large works, particularly Les Jeux de l'Agriculture; and the Gomme des Foiurs, by Bernard de Pailly, a poor porter, who seems to have been placed by fortune in a station for which nature never intended him; Le Théâtre d'Agriculture, by Deféure; and L' Agriculture et genre Rustique, by Meiffers Etienne, Liebault, &c.

Nearly in the same period, the practice of husbandry became more prevalent among this people and the French, than the publishing of books on the subject. Their intention seemed to be that of carrying on a private lucrative employment, without instructing their neighbors. Whoever therefore became detestful of copying their method of agriculture, was oblig'd to visit that country, and make his own remarks on their practice.

The principal idea they had of husbandry was, by keeping the lands clean and in fine tilth, to make a farm resemble a garden as nearly as possible.

Such an excellent principle, at first setting out, led them of course to undertake the culture of small farms only, which they kept free from weeds, continually turning the ground, and manuring it plentifully and judiciously. When they had by this method brought the soil to a proper degree of cleanliness, health, and sweetness, they chiefly cultivated the more delicate grases, as the safest means of obtaining a certain profit upon a small estate, without the expense of keeping many draught horses and servants. A few years experience was sufficient to convince them, that ten acres of the best vegetables for feeding cattle, properly cultivated would maintain a larger flock of grazing animals than forty acres of common farm grass on land badly cultivated. They also found, the best vegetables for this purpose were lucerne, flaxman, trefoil of all kinds, fiddle turnips, &c.

The grand political secret of their husbandry, therefore, consisted in letting farms on improvement. They were also to have discovered nine forts of manure; but what they all were we are not particularly informed. We find, however, that marl was one of them; the use and virtues of which appear also to have been well known in England two hundred years ago, although it was afterwards much neglected. They were the first people among the moderns who ploughed in green crops for the sake of fertilizing the soil; and who confined their sheep at night in large sheds built on purpose, the floors of which were covered with sand or virgin earth, &c. which the shepherd carried away each morning to the compost dunghill.

In England, during the civil wars, though the operations and improvements in husbandry suffered some temporary checks, there flourished several excellent writers on the subject, and the art itself received considerable encouragement. Sir Hugh Platt was one of the most ingenious husbandmen of the age in which he lived; yet so great was his modesty, that all his works, except his Paradise of Flora, seem to be posthumous. He held a correspondence with most of the lovers and patrons of agriculture and gardening in England; and such was the justice and modesty of his temper, that he always named the author of every discovery communicated to him. Perhaps no man in any age discovered, or at least
AGRICULTURE.

leat brought into use, so many new kinds of manure. This will be evident to those who read his account of the compost and covered dung-hills, and his judicious observations on the fertilizing qualities lodged in salt, street-dirt, and the fulriage of streets in great cities, clay, fuller’s earth, moorish earths, dung-hills made in layers, fern, hair, calcination of all vegetables, malt-dirt, willow-tree earth, foaper’s ashes, urine, marle, and broken pitchparks.

Gabriel Plattes may be said to have been an original genius in husbandry. He began his observations at an earlier period, in the reign of Queen Elizabeth; and continued them down to the Commonwealth. But notwithstanding the great merit of this writer, and the essential service he had rendered his country by his writings, the public ungratefully suffered him to starve and perish in the streets of London; nor had he a shirt on his back when he died.

Samuel Hartlib, a celebrated writer on agriculture in the last century, was highly esteemed and beloved by Milton, and other great men of his time. In the preface to his work intitled His Legacy, he laments that no public director of Husbandry was established in England by authority; and that they had not adopted the Flemish method of letting farms upon improvement. This remark of Hartlib’s procured him a pension of L. 100 a-year from Cromwell; and the writer afterwards, the better to fulfill the intention of his benefactor, procured Dr. Beatt’s excellent annotation on the Legacy, with other valuable papers from his numerous correspondents.

The time in which Hartlib flourished seems to have been an era when the English husbandry rofe to great perfection, compared with that of former ages; for the preceding wars had impoverished the country gentlemen, and of course made them industrious. They found the cultivation of their own lands to be the most profitable station they could fill. But this wise turn was not of long continuance. At the restoration, they generally became infected with that intoxication and love of pleasure which succeeded. All their industry, and knowledge were exchanged for neglect and dissipation; and husbandry deserted almost entirely into the hands of common farmers.

Evelyn was the first writer who inspired his countrymen with a desire of reviving the study of agriculture; and he was followed by the famous Jethro Tull. The former, by his admirable treatises on earth and on planting, and the latter, by showing the superior advantages of the drill-husbandry, excited numbers to bring their theory to the test of fair experiment.

Many valuable and capital improvements have, since that period, been made in English husbandry; and these great men have been succeeded by a variety of writers, many of whom have done essential service, by enlightening the minds of their countrymen, and exciting them to emulation.

About the middle of the last century, Ireland began to make a considerable figure in the art of husbandry. It must indeed be confessed, that the Irish had very strong prejudices in favour of a wretched method of agriculture, till Blyth opened their eyes by his excellent writings. Since that time, a spirit of improvement has more or less been promoted, and in many instances carried on with great zeal, by the

nobility, clergy, and gentry of that kingdom. In proof of this, it will be sufficient to observe, that the Transations of the Dublin Society for encouraging Husbandry are now cited by all foreigners in their memoirs relating to that subject. And the observations of that discerning and judicious writer, Arthur Young, Esq; in his late Tour through that kingdom, show, that in many respects improvements there have of late years made a progress nearly as rapid as in England.

After the peace of Aix-la-Chapelle, most of the nations of Europe, by a sort of tacit consent, applied themselves to the study of agriculture, and continued to do so, more or less, amidst the universal confusion that succeeded.

The French found, by repeated experience, that they could never maintain a long war, or procure a tolerable peace, unless they could raise corn enough to support themselves in such a manner as not to be obliged to harass terms on the one hand, or to perish by famine on the other. This occasioned the king to give public encouragement to agriculture, and even to be present at the making of several experiments. The great, and the rich of various ranks and stations, followed his example; and even the ladies were candidates for a share of fame in this public-spirited and commendable undertaking.

During the hurry and distresses of France in the war of 1756, considerable attention was paid to agriculture. Prize-questions were annually proposed in their rural academies, particularly those of Lyons and Bourdeaux; and many judicious observations were made by the Society for improving agriculture in Brittany.

Since the conclusion of that war in 1763, matters have been carried on there with great vigour. The university of Amiens made various proposals for the advancement of husbandry; and the Marquis de Tourbilly (a writer who proceeded chiefly on experience) had the principal direction of a Georgical society established at Tours.

The society at Rouen also deserves notice; nor have the king and his ministers thought it unworthy their attention. There are at present about fifteen societies existing in France, established by royal approbation, for the promoting of agriculture; and these have twenty co-operating societies belonging to them.

About this time vigorous exertions began to be made in Russia to introduce the most approved system of husbandry which had taken place in other parts of Europe. The present Empress has sent several gentlemen into Britain and other countries to study agriculture, and is giving it all possible encouragement in her own dominions.

The art of agriculture has also been for near 50 years publicly taught in the Swedish, Danish, and German universities, where the professors may render efficient service to their respective countries, if they understand the practical as well as the speculative part, and can converse with as much advantage with the farmer as with Virgil and Columella.

Even Italy has not been totally inactive. The Neapolitans of this age have condescended to recur to the first rudiments of revived husbandry, and began to study anew the Agricultural System of Crecenzio, first published in 1478. The people of Bergamo have pur-
A G R I C U L T U R E.

In an art so extensively useful to mankind, and which has been so universally practised since the creation of the world, it is natural to expect the most exact and perfect theory. But in this we are totally disappointed.

One reason of this want of a distinct theory of agriculture is, the ignorance of what is properly the food of vegetables; for as the art of agriculture consists principally in feeding them with a proper quantity of food, in the most favourable circumstances, it is evident, we might proceed upon a much surer foundation if we could ascertain what their proper nourishment is, than we can do without this knowledge.

The reason of the great differences regarding the practice, probably, is the difficulty of making experiments in agriculture. It is not in this art as in Mechanics, Chemistry, &c. where an experiment can be made in hour, or a day or two at farthest: an experiment in agriculture cannot be properly made in less than several years. Some favourable circumstances, quite foreign to the experiment itself, may concur to produce plentiful crops for a year or two; and
and thus the farmer may be induced to publish his fancied improvements; which falling in the hands of others, or perhaps even in his own on a repetition of the experiment, the new improvements are totally neglected, and things continue in their old way. Were he, however, capable of seeing and handling the food of vegetables, as well as he can do that of a horse or an ox, and procuring it in any imaginable quantity, it is plain, that he would be able to cause vegetables grow in their utmost luxuriance, or, if we may be allowed the expression, _fatten_ them, with as great certainty as he can fatten a horse or an ox, when he hath plenty of proper food to give them.—To ascertain what this food is, therefore, must be a step towards the perfection of agriculture; and to this we shall contribute our endeavour.

**Sect. I. Of the proper Food of Plants.**

We shall not here spend time in refuting the theories of those who imagined the vegetable food to consist of oily and fatuous substances. A more probable supposition has been, That Water and Air are the proper vegetable food, to which alone they owe their increase in bulk and weight.—That plants cannot be supported _ex cepta se_; plants._—That plants cannot be supported from whatever substance, conftitute at least one species of vegetable food; and when vegetables are put into such circumfances that the stems of purifying bodies can have access to them, we are sure they will thrive the better.

The Doctor also found, that by agitating putrid air in water, part of which was exposed to the atmosphere, the water acquired a very putrid noxious smell; which shows, that water, as well as air, is capable of absorbing those effluvia which are found proper food for vegetables.

We cannot help concluding, therefore, that in the continual ascent of water in vapour, and its descent again in rain, which is a much more effectual _agitation_ than could be made by Dr Priestley, the water must be very intimately combined with the phlogistic or putrid effluvia which are contained in the air. To this union we are led strongly to suppose that rain-water owes its fertilizing qualities; for the purest spring waters, though most wholesome for animals, are not found to be fit for promoting the growth of vegetables.—As, therefore, vegetables evidently receive nourishment both by their leaves and roots, and incerase remarkably in bulk by absorbing the putrid effluvia from the air; and as

they likewise increase in bulk by admitting water to their roots, and more so when the water contains much of that kind of effluvia than when it contains less: so we would conclude, that the nourishment received by the roots of plants is of the same kind with that received by their leaves; and that this food may be given them in greater plenty than they naturally receive it, by impregnating the air which surrounds them, or the water which moistens them, with a greater quantity of putrid matter than what they contain in a natural state.

**Sect. II. The foregoing Theory confirmed from considerations on the nature of vegetable _nourishment_, and the different kinds of Manures found proper for fertilizing the Soil.**

Though plants will grow on any kind of earth, All kinds of and food vigorously, if plentifully supplied with earth nourished; yet some kinds of soils are found to be more proper for supplying them with nourishment than others.—We cannot, indeed, allow the inferences to be quite fair, which some would draw from experiments on plants set in mere sand, &c.; viz. that the earth is of no other use to vegetation than to afford a proper support to the plant, that it be not easily moved out of its place; because the experiments made on single vegetables are always performed in or very near houses, where the air is by no means so pure as in the open fields, and consequently where they have an opportunity of receiving as much nourishment from the air as may compensate the want of what they would have derived from the earth if planted in a rich soil. Lord Kames, in the Gentleman Farmer, mentions an experiment wherein a pea was planted on some cotton spread on water, in a phial. It sprang, and pulsed roots through the cotton into the water. The plant grew vigorously, and, at the time of his writing the experiment, carried large pods full of ripe food.—From this experiment, or others of a similar kind, however, a farmer would not be thought to act very judiciously, who should conclude that nothing more was requisite to produce a plentiful crop, than to keep his fields contantly soaking with water, and apply his labour only for that purpose, without regarding either tillage, manure, or the difference of soils. Experience has abundantly shown, that by certain operations performed on the earth itself, it is rendered much more capable of supplying vegetables with plenty of nourishment than if such operations were omitted; and that some kinds of soils cannot without certain additions be rendered fit for this purpose as others; and this is what constitutes the difference between a rich and a poor soil.

That species of earth which is capable of supply- ing the vegetable kingdom with nourishment in the greatest plenty, is found best in well cultivated gardens. It is not, however, even in these, found in perfect purity; being constantly mixed with greater or less proportions of sand, small stones, &c. It can be had by itself, and entirely separated from all other substances, only by suffering vegetable or animal bodies to putrefy. By undergoing this operation, they are at last reduced into a kind of earth, which appears perfectly the same, from whatever substance it is produced. Of this earth Dr Lewis gives us the following characters. It is in- diffoluble.
AGRICULTURE.

There may perhaps be another cause why putrefaction will be of benefit to consumptions. It is well known, that, after some days of drought, on the falling of rain that moistens the earth, there arises a grateful smell, which we are all sensible of; and this is commonly attributable to the vegetables, which before flipples, but now refreshed by rain, perspire more copiously. But Reaumur observed, that a like fragrancy is also perceptible after rain when the corn has been cut down in the fields, where there only remains dry stubble; and examining the matter more particularly, he found that dry earth is without smell, but as soon as it is moistened to the degree of having the confidence of letting play, it then diffuses a strong smell; but if more water is added, the smell is diminished, may even quite disappear. Neither does it seem an easy matter to exhaust that power of producing smells which the earth is possessed of. Every day, during a fortnight, he made cakes of moistened earth; and having dried and wetted them over again, he could not perceive that the earth was less fragrant after all these repeated experiments, if it was again wetted. He further observed, that this fragrancy does not diffuse itself to anything at a great distance, without being much diminished, and soon entirely gone.—It has been observed, that this expiration of the earth ceases if thunder and storms soon follow: while they continue, it begins to return; and when over, the same fragrancy of the earth for some hours affects the smell of a man as he walks along over a considerable tract of ground. There is one, I believe, but has sometimes made this observation; and hence the earth, when moistened to a certain degree, seems to exhale fragrant odours, and indeed varies in various places, as we are sensible of from their diversity. They are for the most part of a fabulous quality; as some perfumes quite faint and languid in the summer-heats perceive themselves wonderfully refreshed, whilst, after rain, they snuff up the fragrant odor. In some places those effluvia are perhaps bad, and may be the causes of diseases.

This property of emitting a fragrant smell is likewise taken notice of by Dr Home in his Principles of Agriculture and Vegetation. Some physicians have preferred a bath of earth for the cure of consumptive patients; and Dr Solano de Luque was of opinion, that the earth had the property of absorbing contagious misfortunes into it; but whether it can absorb these misfortunes from living bodies or not, it certainly can absorb them from dead ones; for a piece of putrid meat will be much sweetened by lying for a short time in the ground.

From all this we cannot indeed infer, that putrid air is sweetened by mere earth; but we discover what transmutations are perhaps more important, namely, that though earth is the common receptacle of all putrid matters both animal and vegetable, there is a change made on them when in it, which cannot be made either by air or water. Thus, if the carcase of a small animal is left to putrefy in the air, it becomes exceedingly offensive, and continues so from first to last. The same thing happens if it is left to putrefy in water. But, in earth, the carcase is quite different. After the carcase is consumed, the earth which has absorbed all the putrid effluvia, instead of exhaling an offensive odour, diffuses an agreeable one; and thus we may see that it is endowed with a power no less remarkable than that of at


The existence of such a power as that of transmutation we will be obliged to own, whatever we imagine the vegetable food to consist of; for it is impossible to solve the phenomena of vegetation by attractions and repulsions. If we suppose the vegetable food to be felt, let us attack and repel it as we will, it remains felt from first to last. Let us suppose it water, the cafe is the fame; and, by mere attraction, nothing but mafies of salt, or pools of water, could be produced. The cafe is the fame on our hypothesis; for, supposing plants compos'd of the patriarch effulsion of others, and of dead animals, if nature was ended with no other power than attraction or repulsion, the vegetable would necessarily be a corrupted mafs like that of which it was compos'd.—This power, as we have already seen, resides only in the earth, and in the vegetables themselves; air and water can indeed act as powerful agents, but cannot transform or compound. We must next consider the nature of those different operations, which, from time immemorial, have been performed on the earth, in order to cause it produce the greatest crops of vegetables. If all of these shall be found conspiring to one general purpose, then the shortest and most easy method of attaining that purpose is undoubtedly the most proper to be practised in agriculture, whether it hath been as yet put in execution or not. There are,

1. Frequent ploughing, or following. The immediate consequences of this is to expel different quantities of the soil to the action of the air and sun, which will not fail to exert their solvent powers upon it. In consequence of this action, the earth is partly reduced to powder; many of the roots of vegetables, with which it always abounds, are dissolved and putrefied; and the earth produced from them mixes with the reft, as well as the effuvia they emit during their dilution. The earth soon begins again to exert its prolific powers, and a crop of vegetables is produced. By a repetition of the ploughing, there are turned with their roots upwards, are exposed to the solvent powers of the air and light; in consequence of which they die, are purrefed, and more of the native foil is reduced to powder, and mixed with them. By a frequent repetition of this process, the foil becomes vastly more tender, and approaches to the nature of garden mould, and its fertility is considerably increased.

Lord Kames is of opinion, that the reafon of the fertility of any foil being increafed by following, is, that its capacity of retaining water is increafed. But this cannot be admitted; for so far from being more difpofed to retain water by its pulverification, the foil is evidently more difpofed to part with it, either by evaporation, or by effufling the moisture to percolate thro' it. In this refpect it is far inferior to clay; for though dry garden-mould absorbs water much more quickly than clay, it also dries much sooner, and thus all the advantage is lost.

The fertilizing quality of water will easily be accounted for on the fame principles. When grown vegetables are covered with water, their growth, however vigorous before, is immediately flop'd, unless they be of the aquatic kind: they die, are difolved, and putrefied, in which cafe, their finer parts are undoubtedlv aborbed by the earth: and thus the floating, as it is called, of fields with water, anfwers the purpofe of following, with very little trouble. This is not all; forflaguating water always depofites a feditlent, which mixing with the difpofed parts of the vegetables all over the field, forms an excellent manure; and when the water is allowed to run off, the heat of the fab fon brings the highest degree of putrefaction on the dead vegetables; the effuvia of which, mixing with the mud depofited from the water, makes it exceedingly rich.

Upon the fuppofition of oily and faltine food for vegetables, this operation must certainly be prejudicial; for nothing can so effectually deprive any fubftance of falt as fleping it in water. Neither will water either deposit oil from itself, or fuffer it to mix with the ground if accidentially brought to it; nay, though a field were previously impregnated with oil, upon percolating it with water great part of the oil would be feparated, and rise to the top: so that, in either cafe, this operation could not fail to impoverifh land rather than enrich it; and as vegetables are found to be supplied with food in plenty by an operation which muft undoubtedly tend to take away both oils and faltines from them, we cannot help thinking this a demonstration, that their food is composed neither of oil nor falt.

3. Manuring, or mixing the foil with different fubftances.—We shall here confine ourselves to thofe which are of undoubted efficacy, and have their eredit etabli{hed by long experience. These are, 1. lime, chalk, marle, thells, or other earths, called by the chemifs calcareous earths; 2. foat; 3. ashes; 4. dung of different kinds.—(1) The lime, chalk, marle, and thells, are all found to be of the fame nature. The marle differs from the reft, only in having a mixture of clay along

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To those who reckon the food of vegetables to con-"
Part I. AGRICULTURE.

Theory. along with its calcareous part. These contain neither fall nor oil of any kind; they readily imbibe water, and as readily part with it. Quicklime, indeed, retains water very obnubilatingly; but such lime as is laid upon the ground soon returns to the same state in which it originally was; and powdered limetone is found to answer as well for the purposes of manure as that which has been burnt; so that here we may consider them all as substances of the same class. If any of these substances are mixed with dead animal or vegetable bodies, they remarkably quicken their dissolution and corruption, as appears from Sir John Pringle's experiments. When mixed with the soil, therefore, they most undoubtedly exert their powers on living substances as they find there, in the same manner as they do on others; that is, they must hasten their dissolution and putrefaction, and give the pure vegetable mould an opportunity of absorbing their purrid streams, and consequently of being fertilized by it in the same manner as by purrid substances of any kind.

(2.) Those who contend for oily and fatty principles in the vegetable food, avail themselves of the usefulness of foot as a manure; which is not only oily of itself, but affords a great quantity of volatile salt, along with some neutral sal-ammoniac. It must be remembered, however, that not an atom either of volatile salt or sal-ammoniac can be extracted from foot without a considerable heat, which no soil can give, nor could any vegetable bear. Neither doth its oil appear without a great degree of heat: and though it feels somewhat unctuous to the touch, this is but a mere deception; for no true oil, capable of floating on water, can be obtained from foot without distillation. It is impossible, therefore, that foot can act upon the soil either as an oily or a saline substance; how far it is capable of dissolution by putrefaction, or being otherwise converted into an earth, hath not yet been determined by experiments; but as it yields, on distillation, the same principles which are obtained from animal or putrid vegetable substances, it is probable that foot enriches the ground in the same manner that they do. (3.) The use of ashes in manure is likewise urged as an argument for the food of vegetables being of a saline nature; as it is known, that the common alkaline salts are procured by lixiviating the ashes of wood and other vegetables. Experience, however, shows us, that ashes are of no less a nature after the salts are extracted from them than before. Indeed, if there be any difference, it is in favour of the washed ashes. The alkali itself, though in Sir John Pringle's experiments it was found to be antiseptic, or a refiter of putrefaction, is nevertheless a powerful disinfectant; and as it must soon lose its alkaline properties when mixed with the earth, in consequence of the universal existence of the vitriolic acid, those substances which it has dissolved will be more disposed to putrefaction than before, and consequently tend to fertilize the ground in the manner we have already described. The washed ashes are fibres, or promotors of putrefaction, and consequently act in the same manner as chalk or limetone. (4.) All kinds of dung are so much disposed to putrefaction, that it is difficult to imagine any other way in which they can be serviceable to vegetation than by their purrid effluvia. People indeed may dream of imaginary salts in dung; but if they knew or considered the difficulty of procuring fall of any kind from dung, they would probably alter their sentiments. The volatile salts procured from this as well as other animal matters, are mere creatures of the fire; putrid urine produces them indeed without heat, but several other animal substances. Nevertheless, other purrid substances will fertilize the ground as well as urine, and therefore must act in some other way than by their salts. Though Dr Priestley's experiments had never been made, we could have formed no other rational supposition concerning the manner in which purrid substances fertilize the earth, than what we have already done; but as he has shown that vegetables are prodigiously increased in bulk by the mere contact of these purrid streams, where no saline substances that could have access to them, we cannot help thinking this a decisive experiment concerning the manner in which the ground is fertilized by manuring with dung or other purrid substances.

We shall conclude this part of the subject with an account of some experiments concerning the effects of saline substances on the growth of vegetables. The following are related by Lord Kames, in his Gentleman Farmer. A number of Jerusalem artichokes were set in pots filled with pure sand. One plant was kept as a standard, being nourished with water only. Other plants of the same kind were nourished with water in which salt of tartar, a fixed alkali, was dissolved. These grew more vigorously than the standard plant; but, by reiterated waterings, there came to be such an accumulation of the fixed alkali among the sand, as to make the plants decay, and at last to die. Some plants were nourished with water in which sal-ammoniac, a volatile alkali, was dissolved. These grew also well for some time; but, like the former, were destroyed by frequent waterings of it. Weak lime-water promoted the growth of its plants more than common water. But water completely saturated with quicklime, produced more noxious than that which contained a fixed alkali, though less than that which contained a solution of volatile alkali. Urine promoted, for a long time, the growth of its plants; and the most purrid appeared to have the strongest effect; but at last it totally destroyed them. Water impregnated with purrid animal and vegetable substances, did more efficiently promote the growth of its plants than any other solution; and in every stage of the proofs appeared to be Salutary. With regard to other saline substances, there are not many experiments which can be depended upon concerning their qualities as manure. Mr Anderson relates an experiment made with common salt; the success of which, we apprehend, may justly enough be taken as a specimen of what is to be expected from manures of a similar kind. He marked out a circle of six feet diameter in the middle of a grass-field, which he disfigurised by driving a stake in its centre. All over this circle he sowed common salt, which, about the stake, lay near an inch thick on the ground. In this stake he left it to the operation of nature. The grass sprang up as usual, neither better nor worse about the stake than in the rest of the field, and the place where the circle was could be distinguished only by the stake, which was left there for some years.

Upon these experiments we need make very few observations. They are so much in favour of our theory, that they seem made on purpose to confirm it. The fixed
Agriculture.

Part I.

Theory.

fixed alkali employed in Lord Kames's experiments would first exert its solvent powers on such heterogeneous substances as it met with among the sand: for no sand can be supposed to be perfectly free of these. As long as it exerted its strength on these only, the plant would thrive, for the reasons we have already mentioned; but having exhausted the small quantity of substances contained in the sand, it would next attack the plant itself, which consequently would decay and die. The same effects would necessarily follow in a greater degree from strong lime-water which contains lime in its caustic state; for this is a more powerful solvent than fixed alkali itself, and would not fail to destroy everything it touched; nor is it at all improbable that the plant would seem to grow vigorously by the dissolution of part of its own roots, more nourishment being by this means given to those which remained found.

Volatile alkali is likewise a powerful solvent: but, by reason of its volatility would exert its caustic power on the plant sooner than either lime or fixed-alkali; and accordingly it seems to have been the most destructive of any thing that was tried. It seems owing to this, that muriatic urine at last destroyed the plants whose growth it so long promoted; while water impregnated with other purrid matters, which yield no volatile alkali without heat, proved always salutary.

From all this, we may draw the following general conclusion, viz. That the principal end which a farmer ought to keep in view, is to impregnate his ground as much as possible, with substances which either actually contain purrid matter, or which are in their own nature feptic, or promoters of putrefaction. To impregnate the air with purrid effluvia is impolitic: and though it could be done, would be highly dangerous; for however salutary such effluvia may be to vegetables, nothing can be more fatal to mankind. The purrid substances, therefore, can only be used by mixing them with the earth; and in whatever manner they can be most perfectly, and in the greatest quantity, mixed with the soil, there the best crops may be expected.

Sect. III. Of the different Soils, and the Manures most proper for each.

According to the theory we have just now laid down, the richest soil must be that which contains the greatest quantity of purrid matter, either animal or vegetable; and such is the earth into which animal and vegetable substances dissolve themselves. Was this earth to be had in perfection, it is evident it could not stand in need of manure of any kind, or be the least enriched by it; for containing an immense quantity of purrid matter, it would freely communicate it to the vegetables planted in it, which would grow in the most luxuriant manner, without requiring any other care than that of keeping them constantly supplied with water. If we suppute the crop left upon the ground to putrefy and mix with the earth as before, the soil will contain the same quantity of purrid matter the second year that it did the first, and be equally prolific: but if the crop is removed to another place, and nothing is brought back to enrich the ground in its stead, it is evident, that it will contain less of the true vegetable food the second year than it did the first, and consequently be less prolific. For some time, however, the difference will not be perceptible; and people who are in possession of such ground may imagine that they enjoy a soil which will be perpetually fertile; but long experience has taught us, that the richest soils will at last be exhausted by repeated cropping without manure, as according to our theory they ought to be.

Where the ground has been suffered to remain uncultivated for many ages, producing all that time succulent plants which are easily putrefied, and trees, the leaves of which likewise contribute to enrich the ground by their falling off and mixing with it, the soil will in a manner be totally made up of pure vegetable earth, and be the richest, when cultivated, that can be imagined. This was the case with the lands of America. They had remained uncultivated perhaps since the creation, and were endowed with an extraordinary degree of fertility; it is nevertheless certain that such grounds as have been long cultivated, were so much exhausted, as to be not much better than the generality of cultivated grounds in France or England. Here, then, we have an example of one species of poor soil; namely, of poor soil one that has been formerly very rich, but has been so much deprived, by repeated cropping, of great parts of the vegetable food it contained. The farmer, who in possession of such ground, would no doubt willingly restore it to its former state; the present question is, What must be done in order to obtain this end? We have mentioned several kinds of manures which long practice has recommended as serviceable for improving ground: we shall suppose the farmer tries lime, or chalk; for, as we have already seen, their operations upon the soil must be precisely the same. This substance, being of a septic nature, will act upon such parts of the soil as are not putrefied, or but imperfectly so; in consequence of which, the farmer will reap a better crop than formerly. The septic nature of the lime is not altered by any length of time. In ploughing the ground, the lime is more and more perfectly mixed with the earth, and gradually exerts its power on every putrefiable matter it touches. As long as any matter of this kind remains, the farmer will reap good crops: but when the putrefiable matter is all exhausted, the ground then becomes perfectly barren; and the caustic qualities of the lime are more unjuftly blamed for burning the ground, and reducing it to a caput mortuum; while it is plain, the lime has only done its office, and made the soil yield all that it was capable of yielding.

When the ground has been long uncultivated, producing all the time plants, not succulent, but such as are very difficultly disolved, and in a manner incapable of putrefaction; there the soil will be excessively barren, and yield very scanty crops, tho' cultivated with the greatest care. Of this kind are those lands covered with heath, which are found to be the most barren of any, and the most difficulty brought to yield good crops. In this case lime will be as serviceable, as it was detrimental in the other: for by its septic qualities, it will continually reduce more and more of the soil to a purrid state; and thus there will be a constant succession of better and better crops, by the continued use of lime when the quantity first laid on has exerted all its force. By a continued use of this manure the ground will be gradually brought nearer and nearer to the nature of garden-mould; and, no doubt, by proper care, might be made

End to be kept in view by a farmer.

Richest soils must at last be impoverished.

One species of poor soil meliorated by lime.
made as good as any; but it will be as great a mistake to imagine, that, by the use of lime, this kind of soil may be rendered perpetually fertile, as to think that the other was naturally so; for though lime enriches this soil, it does so, not by adding vegetable food to it, but by preparing what it already contains; and when all is properly prepared, it must as certainly be exhausted as in the other case.

Poor soils, how restored.

Here, then, we have examples of two kinds of poor soils; one of which is totally destroyed, the other greatly improved, by lime, and which therefore requires very different manures; lime being more proper for the latter than dung; while dung, being more proper to restore an exhausted soil than lime, ought only to be used for the first. Besides dunging land which has been exhausted by long cropping, it is of great service to let it lie fallow for some time: for to this it owed its original fertility; and what gave the fertility originally cannot fail to restore it in some degree.

By attending to the diffusion between the reasons for the poverty of the two kinds in the part above mentioned, we will always be able to judge with certainty in what cases lime is to be used, and when dung is proper. The mere poverty of the soil is not a criterion whereby we can judge; we must consider what hath made it poor. If it is naturally so, we may almost infallibly conclude, that it will become better by being manured with lime. If it is artificially poor, or exhausted by continual cropping, we may conclude that lime will entirely destroy it. We apprehend, that this is natural kind of poverty only which Mr. Anderson says in his Essays on Agriculture, may be remedied by lime; for we can scarce think that experience would direct any person to put lime upon land already exhausted. His words are,

"Calcaneous matters act as powerfully upon land that is naturally poor, as upon land that is more richly impregnated with those substances that tend to produce a luxuriant vegetation."

"Writers on agriculture have long been in the custom of dividing manures into two classes; viz. Exciting manures, or those that tended directly to render the soil more prolific, however fertile it may be; among the foremost of which was dung: Exciting manures, or those that were supposed to have a tendency to render the soil more prolific, merely by acting upon those enriching manures that had been formerly in the soil, and giving them a new stimulus, so as to enable them to operate anew upon that soil on which they had formerly fertilized. In which clays of stimulating manures, lime was always allowed to hold the foremost place."

"In consequence of this theory, it would follow, that lime could only be of use as a manure when applied to rich soils—and when applied to poor soils, would produce hardly any, or even perhaps hurtful, effects."

"I will frankly acknowledge, that I myself was so far imposed upon by the beauty of this theory, as to be hurried along with the general current of mankind, in the firm persuasion of the truth of this observation, and for many years did not sufficiently advert to those facts that were daily occurring to contradict this theory. I am now, however, firmly convinced, from repeated observations, that lime, and other calcaneous manures, produce a much greater proportional improvement upon poor soils than such as are richer."

That lime alone, upon a poor soil, will, in many cases, produce a much greater and more lasting degree of fertility than dung alone.

Thus far Mr. Anderson's experience is exactly conformable to the theory we have laid down, and what ought to happen according to our principles. He mentions, however, some facts which seem very strongly to militate against it; and indeed he himself seems to proceed upon a theory altogether different.

"Calcaneous matter alone (says he) is not capable of raising plants to perfection—it would be necessary to be mixed with it in certain proportions, before it can form a proper foil. It remains, however, to be determined, what is the due proportion of these ingredients for forming a proper foil.

"We know that neither chalk, nor marl, nor lime, can be made to nourish plants alone; and soils are sometimes found that abound with the two first of these to a faulty degree. But the proportion of calcaneous matter in the first is so much larger than could ever be produced by art, where the soil was naturally deficate of these substances, that there seems to be no danger of erring on that side. Probably it would be much safer to correct the defects of these soils in which calcaneous matters superabound, by driving earth upon them as a manure, than is generally imagined; as a very small proportion of it sometimes affords a very perfect foil."

I shall illustrate my meaning by a few examples.

"Near Sandifer, in the county of Cashel, there is a very extensive plain on the sea-coast, endowed with a very soil, with a most singular degree of fertility. In all seasons perpetually it produces a motl luxuriant herbage, although it never suffered any manure since the creation; and has been for time immemorial subject to the following course of crops.

"1. Bear, after once ploughing from grass, usually a good crop.

"2. Bear, after once ploughing, a better crop than the first.

"3. Bear, after once ploughing, a crop equal to the first.

"4. 5. and 6. Natural grass, as clofe and rich as could be imagined, might be cut, if the possession so inclined, and would yield an extraordinary crop of hay each year."

"After this the fame course of cropping is renewed. The foil that admits of this singular mode of farming, appears to be a pure incoherent sand, deficate of the finest particle of vegetable mould; but, upon examination, it is found to consist almost entirely of broken shells: the fine mould here bears such a small proportion to the calcaneous matter, as to be scarce perceptible, and yet it forms the most fertile soil that ever I yet met with.

"I have seen many other links (downs) upon the sea-shore, which produced the most luxuriant herbage, and the clofeft and sweetest pile of grass, where they confined of holly (sand) which, without doubt, derive their extraordinary fertility from that cause."

"A very remarkable plain is found in the island of Jir-eve, one of the Hebrides. It has been long employed as a common; so that it has never been disturbed by the plough, and affords annually the most luxuriant crop of herbage, consisting of white clover, and
other valuable pasture-grasses, that can be met with anywhere. The soil consists of a very pure shelly sand.

From these examples, I think it is evident, that a very small proportion of vegetable mould is sufficient to render calcareous matter a very rich soil. Perhaps, however, a larger proportion may be necessary when it is mixed with clay than with sand; as poor chalky soils seem to be of the nature of that composition.

To these examples brought by Mr Anderson, we may add some of the same kind mentioned by Lord Kames. His lordship having endeavoured to establish the theory of water being the only food of plants, tho' he himself frequently deviates from that theory, yet thinks it possible, upon such a principle, to make a soil perpetually fertile.

"To recruit (says he) with vegetable food, a soil impoverished by cropping, has hitherto been held the only object of agriculture. But here opens a grander object, worthy to employ our keenest industry, that of making a soil perpetually fertile. Such soils actually exist; and why should it be thought, that imitation here is above the reach of art? Many are the instances of nature being imitated with success. Let us not despair, while any hope remains; for invention never thinks it impossible, UpOn such a principle, to make a soil perpetually fertile.

A field perpetually solid on careons earth promises of a success; but it must be remembered, that imitation is not a power to retain moisture sufficient for its plants; and at the same time must be of a nature that does not harden by moisture. Calcareous earth promises to answer both ends: it prevents a soil from being hardened by water; and it may probably also invigorate its retentive quality. A field that got a sufficient dose of clay-marle, carried above 50 succceive rich corps, without either dung or fallow. Doh not a soil so meliorated draw near to one perpetually fertile! Near the east side of Fife, the coast for a mile inward is covered with fen-fand, a foot deep or so; which is extremely fertile, by a mixture of fea-shells reduced to powder by attrition. The powdered shells, being the fame with shell-marle, make the sand retentive of moisture; and yet no quantity of moisture will unite the sand into a solid body. A soil so mixed, seems to be not far distant from one, perpetually fertile. Thence, it is true, are but faint eflays; but what will not perseverance accomplish in a good cause!"

Having thus, in a manner, positively determined with Mr Anderson, that no dose of calcareous matter can possibly be too great, we cannot help owning ourselves surprised on finding his Lordship expressing himself as follows: "An over-dose of shell-marle, laid perhaps an inch, and an inch and a half, or two inches thick, produces, for a time, large crops; but at last it renders the field a caput mortuum, capable of neither corn nor grass; of which there are too many instances in Scotland; the same probably would follow from an over-dose of clay-marle, stone-marle, or pounded lime-flour."—To account for this, he is obliged to make a supposition directly contrary to his former one; namely, that calcareous matter renders the soil incapable of retaining water. This phenomenon, however, we think is solved upon the principles first laid down, in a satisfactory manner, and without the least inconsistency. As to rendering soils perpetually fertile, we cannot help thinking the attempt altogether chimerical and vain. There is not one example in nature of a soil perpetually fertile, where it has no supply but from the air, and the rain which falls upon it. The above recorded examples can by no means, be admitted as proofs falls chimerical of perpetual fertility. We know, that the grass on the banks of a river is much more luxuriant than what grows at a distance; the reason is, that the water is attracted by the earth, and communicates its fertilizing qualities to it; but was the river to be dried up the grass would soon become like the rest. Why should not the ocean have the fame power of fertilizing plains near its shores, that rivers have of fertilizing small spots near their banks? We see, however, that it hath not; for the sea-shores are generally sandy and barren. The reason of this is, that the waters of the ocean contain a quantity of loose acid*; and this acid is poisonous to plants; but abstracting this acid part, we hesitate not to affirm, that sea-water is more fertilizing than river-water. It is impossible to know how far the waters of the ocean penetrate under ground through a sandy soil. Where they meet with nothing to absorb their acid, there the ground is quite barren; but in passing through an immense quantity of broken shells, the calcareous matter we are very certain, will absorb all the acid; and thus the soil will be continually benefited by its vicinity to the ocean. All the above fields, therefore, are evidently supplied with nourishment from the ocean: for if the salt-water has sufficient efficacy to render fields which are in its neighbourhood barren, why should it not render them fertile when the cause of barrenness is removed from its waters?

After all, the field in Caithness, mentioned by Mr Anderson, seems to have been perpetually fertile only in grass; for though the second year it carried a better crop of bear than it did the first, yet the third year the crop was worse than the second, and only equal to the first. Had it been ploughed a fourth time, the crop would probably have been worse than the first. Ground is not near so much exhausted by grass as corn, even though the crop be cut, and carried off; and still left, if it only feeds cattle, and is manured by their dung; which appears to have been the case with this field. Lord Kames, indeed, mentions fields in Scotland, that, past memory, have carried succeseive crops of wheat, pea, barley, oats, without a fallow, and without a manure; and particulars one on the river Carron, of nine or ten acres, which had carried 409 corps of oats without intermission, and without manure; but as we are not acquainted with any such fields, nor know any thing about their particular situation, we can form no judgement concerning them.

Before the two kinds of soils above mentioned, there are others, the principal ingredient of which is clay or sand. The first of these is apt to be hardened by the heat of the sun, so that the vegetables can scarce penetrate it in such a manner as to receive proper nourishment. The second, if it is not fattened to as to receive a great deal of moisture, is very apt to be parched up in summer, and the crop destroyed; nor has it sufficient adhesion to support plants that have few roots and grow high. From these opposite qualities, it is evident, that these two forms are not for one another: the clay would give a sufficient degree of firmness to the sand, and the sand would break the
Part I. AGRICULTURE.

Theory.—According to Dr. Home's experiments, however, land is the most manure for clay that can be added. He recommends marl or moss. To reduce clay-ground as near as possible to the form of pure vegetable mould, it must first be pulverized. This is most effectually performed by ploughing and harrowing; but care must be taken not to plough it while too wet, otherwise it will concret into hard clods which can scarcely be broken. After it is pulverized, however, some means must be taken to prevent it from concretting again into the same hard masses as before. According to Lord Kames, though clay, after pulverization, will concret into as hard a mass as before, if mixed with water; yet if mixed with dunhill juice, it will not concret any more. Lime also breaks its tenacity, and is very useful as a manure for this kind of soil.

The conclusion we with the practical farmer to draw from our theory is, that there is a certain limit to the fertility of the earth, both as to duration and degree, at any particular time; that the nearer any soil approaches to the nature of pure gaden-mould, the nearer it is to the most perfect degree of fertility; but that there are no hopes of keeping it perpetually in such a state, or in any degree of approximation to it, but by constant and regular manuring with dung. Lime, chalk, marl, &c. may be proper to bring it near to this state, but are absolutely unfit to keep it continually so. They may indeed for several years produce large crops; but the more they increase the fertility for some years, the sooner will they bring on an absolute barrenness; while regular manuring with plenty of dung will always ensure the keeping up the soil in good condition, without any occasion for fallow. What we have said concerning the use of lime, &c. applies likewise to the practice of frequent ploughing, though in a less degree. This tends to meliorate ground that is naturally poor, by giving an opportunity to the vegetable parts to putrefy; but when that is done, it tends to exhaust though not so much as lime. A judicious farmer will constantly strive to keep his lands always in good condition, rather than to make them suddenly much better; lest a few years should convince him that he was in reality doing almost irreparable mischief, while he fancied himself making improvements. As for the ridiculous notions of stimulating the ground by saline manures, we hope they will never enter the brain of any rational practitioner of agriculture.

Sect. IV. Of the different kinds of Vegetables proper to be raised with a view to the Melioration of Soil.

The methods of meliorating soils, which we have mentioned above, consisting of tedious and laborious operations that yield no return at first, it is natural for a farmer to wish for some method of meliorating his ground, and reaping crops at the same time. One very considerable step towards the melioration of ground is, its pulverization. This is accomplished by repeated ploughings (a), as already mentioned; especially if performed in autumn, that the ground may be exposed to the winter's frost; but these ploughings yield no crop as long as the field is not tilled. By planting in the field, however, those vegetables whose roots swell to a considerable bulk, the ground must be constantly acted upon by the swelling of their roots in all directions; and thus the growing of the crop itself may be equal, or superior, in efficacy to several ploughings, at the same time that the farmer enjoys the benefit of it. The plant most remarkable for the swelling of its roots is the potato; and by none is the ground meliorated more, or even so much. They are not, however, equally proper for all soils. In clay they do not thrive, nor are pulvurate; but in hard gravelly or sandy soils, they grow to a large size, and are of an excellent quality. Turnips likewise contribute to meliorate the ground, by the swelling of their roots, though not so much as potatoes. They have this advantage, however, that they thrive in almost any soil. In clay ground, peas and beans thrive exceedingly well, and therefore are proper in this kind of soil as a preparatory for other kinds of grain. These push their roots deep into the ground, and cover it with their leaves more than other crops; so that the fun has not so much access as when it is covered with other kinds of grain. Wherever any of these kinds of vegetables are raised, it is observable, that more or less blackness is communicated to the soil: an evident sign of its melioration; this being the colour of the true vegetable mould, or 'soil foil,' as it is called.

Besides the abovementioned plants, carrots, parsnips, cabbages, and all those vegetables which sink their roots deep in the ground, answer the same purpose of loosening and pulverizing the earth: but as they will not thrive but on ground already well cultivated, they cannot be raised to any advantage for the purpose of meliorating a poor soil.

It hath been customary in many places, particularly in England, to sow turnips, pea, buck-wheat, &c. and then to plough them down for manuring the land. This being similar to that operation of nature by which the renders the uncultivated soils so exceedingly fertile, cannot fail of being attended with singular advantages; and might be looked upon as preferable even to driving dung on the land to fatten it, was it not attended with the entire loss of a crop for that year.

Sect. V. Of destroying Weeds.

What we have already said regarding the cultivation of the soil, respects only the fitting of it for producing all kinds of vegetables indiscriminately. Experience, however, shows, that the ground is naturally much more disposed to produce and nourish some kinds of vegetables than others; and those which the earth seems most to delight in, are commonly such as are of very little use to man; but if neglected, will increase to such a degree, as entirely to destroy the plants intended to be raised, or at least hinder them from coming to perfection, by depriving them of nourishment. The clearing the ground of weeds, therefore, is an article of great importance in agriculture, than the disposing it to produce vegetables of any kind in plenty.

(a) This, however, must be understood with some limitation: for it appears from experience, that many light and thin soils receive detriment rather than advantage from frequent ploughings; particularly in summer, when the sun exhalas the nutritive particles in great abundance.
The weeds may be divided, according to the time of their duration, into annual, or such as spring from a seed, and die the same year; and perennial, that is, such as are propagated by the roots, and last for a number of years. The first kind are the least noxious, and most easily destroyed. For this purpose it will be sufficient to let them spring up till near the time of ripening their seed, and then plough them down before it comes to maturity. It is also of service to destroy such weeds as grow in borders, or neglected corners, and frequently scatter their seeds to a great distance; such as the thistle, dandelion, rag-weed, &c. these are sufficient to propagate their species through a considerable distance, as their seeds are carried with the wind to very considerable distances. A farmer ought also to take care, that the small seeds of weeds, separated from corn in winnowing, be not fown again upon the ground; for this certainly happens when they are thrown upon a dunghill; because, being the natural offspring of the earth, they are not easily destroyed. The best method of preventing any mischief from this cause, would be to burn them.

Perennial weeds cannot be effectually destroyed, but by removing the roots from the ground, which is often a matter of some difficulty. Many of these roots strike so deep in the ground, that they can scarcely be got out. The only method that can be depended upon in this case, is frequent ploughing, to render the ground as tender as possible; and harrowing with a particular kind of harrow, which shall hereafter be described, in order to collect these perilous roots. When collected, they ought to be dried and burnt, as the only effectual method of infuring their doing no further mischief.

There is a particular species of weed, peculiar only to grafs-lands, of a soft spongy nature, called fog, which it is found very difficult to exterminate. Where the land can be conveniently tilled, this weed may be destroyed by covering it with a crop of peas, potatoes, &c. or, passing a heavy roller over the ground will be of great service; for fog owes its origin to too great a laxity of the soil, and will not grow upon firm ground.

Besides these kinds of weeds which are of an herbaceous nature, there are others which are woody, and grow to a very considerable size; such as broom, furze, or whins, and thorns. Broom is an evergreen shrub, that thrives best in sandy soil; and there it grows so vigorously, as scarce to admit any gras under it. It propagates by seed which grows in pods; and these, when fully ripe, break with violence, scattering the seeds all around. Thus, a field which is overgrown with broom, besides the old plants, always contains an infinite number of young ones; so that though the old plants die when cut over, a fresh crop constantly springs up. It may, however, be destroyed by frequent ploughing and harrowing, in the same manner as other perennial weeds are; for it does not for some time carry any seed, and the frequent ploughing encourages the vegetation of all those that are already in the ground, which cannot fail of being destroyed by frequent repetitions of the operation. Another method of destroying broom, is by pasturing the field where it grows with sheep. A few of the old bushes may be left as a shelter, and the rest will be in a good measure prevented from spreading by the cropping of the sheep. These animals are very fond of broom, and greedily devour every young shoot; so that if any remain after the first year, there will not be a vestige the second. If this method of extirpating broom is equally effectual with that of frequent ploughing, it is certainly much more profitable, as there is no food more nourishing to sheep than young broom. Brooms, however, is said to have a singular effect upon sheep; it makes them drink so effectually, that when heated with a little driving, they rumble over, and lie without motion.

The whin is a fine evergreen shrub, carrying a sweet-smelling flower all the year round. It propagates both by seed and by its roots, which spread sometimes to the distance of ten or twelve feet; and hence, when once established, it is with difficulty extirpated. The best method is to set fire to the whins in frosty weather; for trolf has the effect to wither whins, and make them burn readily. The stumps must then be cut over with a hatchet; and when the ground is well softened by rain, it may be ploughed up, and the roots taken out by a harrow adapted to that purpose. If the field is soon laid down to grass, the whins will again spring up in great abundance, from the seeds, and small parts of the roots left in the ground. In this cafe, pasturing with sheep is an effectual remedy; as they are no less fond of young whins than of young broom; and if there are a sufficient number, they will not leave a single plant above ground. But if grass is not immediately wanted, the most effectual method of clearing a field of whins, is by reiterated ploughings.

The thorn, or bramble, spreads its roots very wide, and at the same time sinks them deep in the earth. Though cut in the winter, it rifies, and comes to such perfection as to carry fruit in summer. It can only be extirpated by ploughing up the ground, and collecting the roots.

**Sect. VI. Of the most proper kinds of Vegetables to be raised for the purposes of feeding Cattle.**

**Though this must be an article of the utmost consequence to every farmer, we do not find that it has been much considered. Mr. Anderson seems to have been the first writer on agriculture who hath properly attended to this subject; and what he hath wrote upon it, is rather a catalogue of desiderata, than anything else: and indeed the desiderata on this subject are so many and so great, that we must acknowledge ourselves very unable to fill them up.—To attain to a competent knowledge in this respect, the following things must be taken into consideration.**

1. The wholefomeness of the food for cattle, with regard to health and strength, or frame.
2. The quantity that any extent of ground is capable of yielding.
3. The quantity necessary to feed the different kinds of cattle.
4. The labour of cultivation; and, (5) The soil they require to bring them to perfection, and the effect they have upon it.

With regard to the wholefomeness, it is plain, that as the natural food of wild cattle is the green succulent plants they meet with all the year round, food of this kind, could it be had, must be preferable to hay; and accordingly we find that cattle will always prefer succulent vegetables where they can get them. To find plants
plants of this kind, and having proper qualities in other respects, you must search among those which continue all the year round, or come to their greatest perfection in the winter time. Of these, cabbages bid fair for holding the first place; both as being very succulent, and a very large quantity of them growing upon a small space of ground. In Mr Young's Six Months Tour, we have an account of the produce of cabbages in many different places, and on a variety of soils. The produce by Mr Crow at Keplin, on a clay soil, was, on an average of six years, 33 tons per acre; by Mr Smelt at the Leaues, on a sandy gravel, 38 tons per acre; by Mr Scroop at Danby, on an average of six years, 37 tons per acre; and the general average of all the accounts given by Mr Young, is 36 tons per acre.

Cabbages, however, have the great inconvenience of sometimes imparting a disagreeable flavour to the milk of cows fed with them, and even to the flesh of other cattle. This, it is said, may be prevented by carefully picking off the decayed and withered leaves; and very probably this is the case; for no vegetable inclines more to putrefaction than this; and therefore particular care ought to be taken to pull off all the leaves that have any symptoms of decay. Dr Priestley found that air was rendered noxious by a cabbage-leaf remaining in it for one night, though the leaf did not show any symptom of putrefaction. For milk-cows, probably the cabbages might be rendered more proper food by boiling them.

The culture of the turnip-rooted cabbages has lately been much practiced, and greatly recommended, particularly for the purpose of a late spring feed; and seems indeed to be a most important article in the farming economy, as will be shown in its proper place.

Turnips likewise produce very bulky crops, though far inferior to those of cabbages. According to Mr Young's calculation, the finest soil does not produce above five tons of turnips per acre; which is indeed a very great disproportion; but possibly such a quantity of turnips may not be confumed by cattle as of cabbages; an ox, of 80 stone weight, cat 210 lbs. of cabbages in 24 hours, besides seven pound of hay.

Carrots are found to be an excellent food for cattle of all kinds, and are greatly relished by them. In a rich sand, according to Mr Young's account, the produce of this root was 200 bushels per acre. In a finer soil, it was 640 bushels per acre. A lean hog was fatt ed by carrots in ten days time; he eat 156 lbs; and his fat was very fine, white, firm, and did not boil away in the drolling. They were preferred to turnips by the cattle; which having tasted the carrots, soon became fond of them, as difficulty to be made to eat the turnips at all. It is probable, indeed, that carrots will make a more wholesome food for cattle than either cabbages or turnips, as they are strongly antiseptic; inasmuch as to be used in poultices for correcting the fancies of cancers. It is probably owing to this, that the milk of cows fed on carrots is never found to have any bad taint. Six hores kept on them through the winter without oats, performed their work as usual, and looked equally well. This may be looked upon as the last of their falsity as a food; and it certainly can be no detriment to a farmer to be so much verifiable in medical matters, as to know the impropriety of giving putrefactive food to his cattle. It is well known, that a prodigious difference there is in the health of the cattle fed on peas when fed on potatoes, in comparison of what they enjoy when supplied with food of a contrary nature; and why may there not be a difference in the health of beasts, as well as of men, when in similar circumstances?—It is also very probable, that as carrots are more solid than cabbages or turnips, they will go much farther in feeding cattle than either of them. The above mentioned example of the hog seems some kind of confirmation of this; he being fed, for ten days together, with 21 lbs. least weight of carrots than an ox devoured of cabbages and hay in one day. There is a great disproportion, it must be owned, between the bulk of an ox and that of a hog; but we can scarce think that an ox will eat as much at a time as ten hogs. At Parlington in Yorkshire, 20 work horses, four bullocks, and six milk-cows, were fed on the carrots that grew on three acres, from the end of September till the beginning of May; and the animals never tasted any other food but a little hay. The milk was excellent, and 30 hogs were fattened upon what was left by the other cattle.

Potatoes likewise appear to be a very palatable food for all kinds of cattle; and not only oxen, hogs, &c. are easily fed by them, but even poultry. The cheapness of potatoes compared with other kinds of food for cattle, cannot well be known, as, besides the advantage of the crop, they improve the ground more than any other known vegetable. According to a correspondent of the Bath Society*, of roasting pork is never so moil and delicate as when fed with potatoes, and killed from the barn-door without any confinement. For bacon and hams, two bushels of pea-meal should be well incorporated with four bushels of boiled potatoes, which quantity will fat a hog of twelve stone (fourteen pounds to the stone). Cows are particularly fond of them: half a bushel at night, and the same proportion in the morning, with a small quantity of hay, is sufficient to keep three cows in full milk; they will yield as much, and as sweet butter as the best grafts. In fattening cattle, I allow them all they will eat: a beast of about 35 stone will require a bushel per day, but will fatten one-third sooner than on turnips. The potatoes should be clean washed, and not given until they are dry. They do not require boiling for any purpose but fattening hogs for bacon, or poultry; the latter eat them greedily. I prefer the champion potato to any sort I ever cultivated. They do not answer so well for horses and colts as I expected (at least they have not with me), though some other gentlemen have approved of them as substitutes for oats.

* Letters and Papers agricUll're, &c. vol. iii. art. 16.
largely fed hogs, and esteemed equal in value to barley; it is much more easily grown than barley, as a malt-will grind it completely. Whins are very food of the grain; poultry of all sorts are speedily fattened by it; and the bottom of the plant affords food for bees at a very opportune season of the year, when the meadows and trees are mostly stripped of their flowers. Probably the grain may hereafter be even found a material article in distillation, should a sufficient quantity be raised with that view. From the success of some experiments detailed in the Bath Society-papers, and for which a premium was bestowed, it has been inferred, that this article ought in numerous cafes to supercede the practice of summer-fallowing.

Whins have lately been recommended as a very proper food for cattle, especially horses; and are recommended by Mr Anderson in a particular manner. They have this advantage, that they require no culture, and grow on the very worst soil; but they are troublesome to cut, and require to be bruised in a mill constructed for this purpose; neither is the ground at all mollicated by letting whins grow upon it for any length of time. Notwithstanding these disadvantages, however, as whins continue green all the year round, and when bruised will afford an excellent succulent food, which seems possessed of strongly invigorating qualities, they may be looked upon as the cheapest winter-food that can possibly be given to cattle. According to the calculations of Mr Edelin of Gareford, a single acre, well cropped with whins, will winter six horses: at three or four years growth, the whole crop should be taken, cut close to the ground, and carried to the mill; in which the whins are to be bruised, and then given to the horses. Four acres ought to be planted, that one may be cut each year, at the proper age to be cut; and he reckons the labour of one man sufficient for providing food to this number of horses. He says they all prefer the whins to hay or even to corn.

The herb called burnet hath likewise been recommended as proper food for cattle, on account of its being all eye-keeper; and further recommended, by growing almost as fast in winter as in summer. Of this herb, however, we have very various accounts. In a letter addressed by Sir James Caldwell, F. R. S. to the Dublin Society, the culture of this plant is strongly recommended on the authority of one Bartholomew Rocque, farmer at Wallam-Green, a village about three miles south-west of London.

What gave occasion to the recommendation of this plant, was, that about the year 1760, Mr Wych, chairman of the committee of Agriculture of the London Society for the encouragement of arts, manufactures, and commerce, came to Rocque (who was become very eminent by the premiums he had received from the society), and told him, he had been thinking, that as there are many animals which subsist wholly upon the fruits of the earth, there must certainly be some plant or herb fit for them that naturally vegetate in winter; otherwise we must believe the Creator, infinitely wise and good, to have made creatures without providing for their subsistence; and that if there had been no such plants or herbs, many species of animals would have perished before we took them out of the hands of nature, and provided for them dry meat at a season, when, indigenous plants having been indiscriminately excluded, under the name of weeds, from cultivated fields and places set apart for natural grass, green or rough meat was no longer to be found. Rocque allowed the force of this reasoning; but, and the knowledge of a grass, or artificial pasture, that would vegetate in winter, and produce green fodder for cattle, was lost; at least, that he knew of no such plant. Mr Wych, however, knowing how very great the advantage would be of discovering a green fodder for winter and early in the spring, wrote to Berne, and also to some considerable places in Sweden, stating the same argument, and asking the same question. His answers to these letters were the same that had been given by Rocque. They owned there must be such a plant, but declared they did not know it.

Mr Wych then applied again to Rocque; and desired him to search for the plant to much desired, and to certainly existing. Rocque set about this search with great alacrity; and finding that a plant, called burnet, was of very speedy growth, and grew near as fast in winter as in summer, he took a handful of it and carried it into his stable, where there were five horses; every one of which he fed it with the greatest eagerness, snatching it even without first smelling it. Upon the success of this experiment he went to London, and bought all the burnet-feed he could get, amounting to no more than eight pounds, it having been only used in fields; and he paid for it at the rate of 45s. a pound. Six of the eight pounds of feed he sowed upon half an acre of ground, in March, in the year 1761, with a quarter of a peck of spring-wheat, both by hand. The seed being very bad, it came up but thin. However, he sowed the other two pounds in the beginning of June, upon six rood of ground: this he mowed in the beginning of August; and at Michaelmas he planted the plants on about 20 rood of ground, giving each plant a foot every way, and taking care not to bury the heart. The plants bore two crops of seed the year following; the first about the middle of June, the second about the middle of September; but the June crop was the best. The year after, it grew much taller, and produced two crops of seed, both very good. As it ought not to be cut after September, he let it stand till the next year; when it sheltered itself, and grew very well during all the winter, except when there was a hard frost; and even during the frost it continued green, though it was not perceived to grow. In the March following it covered the ground very well, and was fit to receive cattle.

If the winter is not remarkably severe, the burnet, though cut in September, will be 18 inches long in March; and it may be fed from the beginning of February till May: if the cattle are taken off in May, there will be a good crop of feed in the beginning of July. Five weeks after the cattle are taken off, it may be removed, if that is preferred to its lasting for feed; it grows at the rate of an inch a-day, and is made into hay like other grasses. It may be mown three times in one summer, and should be cut just before it begins to flower. Six rood of ground has produced 1150 pounds at the first cutting of the third year after it was sowed; and, in autumn 1763, Rocque found no less than 300 bushels of the feed.

According to Rocque, the soil in which burnet flourishes best, is a dry gravel; the longest drought never burs
Part I.  

AGRICULTURE.

Theory.

hurts it: and Sir James Caldwell affirms, that he saw a very vigorous and exuberant plant of this kind, growing from between two bricks in a wall in Rocque's ground, without any communication with the soil; for he had cut away all the fibres of the root that had frstched downward, and penetrated the earth, long before the

Bursett was found equally fit for feeding cows, sheep, and horses; but the sheep must not be suffered to crop it too close. Though no feed was left among the hay, yet it proved nourishing food: and Roquette kept a horse upon nothing else, who, at the time of writing the account, was in good heart, and looked well. He affirmed also, that it cured horses of the distemper called the gravis, and that by its means he cured one which was thought incurable; but lays, it is only the first crop which has this effect.

This is the substance of Sir James Caldwell's letter to the Dublin Society, at least as to what regards the culture of Bursett; and it might reasonably be expected, that a plant, whose use was recommended to the public with so much parade, would soon have come into universal use. We are surprised, therefore, on looking into Mr. Miller's Dictionary, to find the following words, under the article Poterium:—"This plant has of late been recommended by persons of little skill, to be sown as a winter pulslum for cattle: but whoever will give themselves the trouble to examine the grounds where it naturally grows, will find the plants left uncut by the cattle, when the grass is not cropped; besides, in wet winters, and in strong land, the plants arc of short duration, and therefore very unfit for that purpose: nor is the produce sufficient to tempt any person of skill to engage in its culture; therefore I wish those perfons to make trial of it in small quantities, before they embark largely in these new schemes."—Mr. Anderfon, too, in his Essays on Agriculture, mentions the produce of bursett being so small, as not to be worth cultivating.

Upon the authority of Mr. Rocque, likewise, the white beet is recommended as a most excellent food for cows; that it vegetates during the whole winter, consecutively is very forward in the spring: and that the most profitable way of feeding cows is, to mow this herb, and give it to them green all the summer. It grew in Roquette's garden, during a very great drought, no less than four feet high, from the 30th of May to the 3d of July, which is more than one month and four days. In summer it grows more than an inch a day; and is best sown in March; a bushel is enough for an acre, and will not cost more than ten shillings. It thrives best in a rich, deep, light soil; it is a great fodder for cattle, and does not communicate any taint to the milk. It produces great abundance of leaves in summer, which may be cut three or four times without injuring the plant. The leaves are more palatable to cattle than most other garden plants, and are found to be very wholesome. The farmers in those parts of Germany where it is chiefly cultivated, and subterranean, it is sold, prefer this species of beet, for feeding cattle, to cabbages, principally because they are not liable to be hurt by worms or insects; but they think they are not so nourishing as turnips, potatoes, or carrots, and that cattle are not nearly so soon fattened by this root as by carrots, parnips, or cabbages. It has even been asserted, that this root affords less nourishment than any of those that have been commonly employed for feeding cattle. This does not correspond with the pompous accounts with which the public have been entertained. Upon the whole, however, it is a plant which seems to deprive the attention of farmers; as on some soils, and in particular circumstances, it may prove a very useful article for the above purposes.

In Mr. Anderson's essays, we find it recommended to make trial of some kinds of grasses, which probably would not only answer for fresh fodder during the winter, but might also be cut for hay in summer. This is particularly the case with that species called fseep's purple sieve and fseep's fseew-gras. We have seen a small patch of this grass in winter 1773; which, having been cut in the month of August or September preceding, was favored from that period, and had advanced before winter to the length of five or six inches; forming the clover pile that could be imagined. And although we had about six weeks of very intense frost, with snow; and about other six weeks, immediately succeeding that, of exceeding keen frost every night, with frequent thaws in the day-time, without any snow, during which time almost every green thing was destroyed; yet this little patch continued all along to retain as fine a verdure as any meadow in the month of May; hardly a point of a leaf having been withered by the uncommon severity of the weather. And as this grass begins to vegetate very early in the spring, I leave the reader to judge what might be the value of a field of grass of this kind in these circumstances.

Of another kind of grass, called purple sieve, Mr. Anderson gives the following character. "It retains its verdure much better than rye-grasses during the winter. But it had more of its points killed by the weather than the former. It likewise rifes in the spring, at least as early as rye-grasses."

This ingenious farmer has also made experiments on the culture of these and several other kinds of grasses; which being very well worthy of attention, we shall here insert. 1. Purple sieve-grasses. "Although this grass is very often found in old pastures, yet it has but a few flower-stalks; and as it is greedily eaten by all domestic animals, these are seldom suffered to appear; so that it usually remains there unperturbed. But it seems to be better able to endure the peculiar ceremony of the dung of dogs than almost any other plant; and is therefore often to be met with in dog-hills, as I call the little hills by road-sides where dogs usually pis and dung: and as it is allowed to grow there undisturbed, the farmer may have an opportunity of examining the plant, and becoming acquainted with its appearance."

"The leaves are long and small, and appear to be roundish,
PLANT is the same family with the former, and agrees with it in several respects; although they may be easily distinguished from one another. Its leaves, like the former, in its natural state, are always rounded, but much smaller; being little bigger than large horse-hairs, or twines-bristles, and seldom exceed six or seven inches in length. But these springing out of the root in tufts, so close upon one another, that they resemble, in this respect, a close hair-brush more than any thing else I know; so that it would seem naturally adapted to form that thick short pile of grass in which sheep are known chiefly to delight. Its flower-stalks are numerous, and sometimes attain the height of two feet; but are more usually about 12 or 15 inches high.

Upon gathering the seeds of this plant, and sowing them as the former, it was found that they sprang up as quickly as any other kind of grass; but the leaves are at first no bigger than a human hair. From each side spring up one or two of these hair-like filaments, that in a short time send out new off-sents, so as quickly to form a sort of tuft, which grows larger and larger, till it at length attains a very large size, or till all the intervals are closed up, and then it forms the closest pile of grass that it is possible to imagine. In April and May it put forth an innumerable quantity of flower-stalks, that afforded an immense quantity of hay; it being so close throughout, that the fythe could scarcely penetrate it. This was allowed for, and till the seed was ripened; but the bottom of these stalks were quite blanched, and almost rotten for want of air before that time.

This
A G R I C U L T U R E.

Part I. Theory.

This was the appearance that it made the first year after it was sowed; but I have reason to think, that, after a few years, it Likewise produces fewer seed-flats, and a greater quantity of leaves than at first. But however that may be, it is certain, that if those are cut down in the spring, it does not, like rye-grass, have a continual tendency to run to seed; but is at once determined to push forth a quantity of leaves without almost any flatts at all: and as all domestic animals, but more especially sheep, are extremely fond of this grass, if they have liberty to pasture where it grows, they bite it so close as never to search in vain for it, when he is treading upon it with his feet. The best way to discover it in any pasture, is to search for it in winter, when the tusks of it may be easily distinguished from every other kind of grass, by their extraordinary elongates, and the deep green colour of the leaves.

It is thus to grow in almost any soil: although it is imagined that it would flourish best in a light sandy soil, as it can evidently live with less moisture than almost any other kind of grass; being often seen to remain in the fods that have been employed in coping for stone-dykes, after all the other grasses that grew in them have disappeared. It is likewise found in poor barren foids, where hardly any other plant can be made to grow at all; and on the surface of dry worn-out peat-mots, where no moisture remains sufficient to support any other plant whatever; but in neither of those situations does it thrive: as it is there only a weak and unwholesome plant, very unlike what it is when it has the good fortune to be established upon a good soil; although it is seldom met with in this last state than in the former.

I will not here repeat what has been already said about the particular property that this plant possesses of continuing all winter; nor point out the benefits that the farmer may reap from this valuable quality. He need not, however, expect to find any verdure in winter on such plants as grow upon the looses moity soil above mentioned; nor, as the frosts in winter always have a power of freezing this soil, the roots of the plants are so lacerated thereby, as to make it, for some time in the spring, to appear dead. Nor will he often perceive much verdure in winter upon those plants that grow upon poor hungry foids, which cannot afford abundant nourishment to keep them in a proper state of vegetation at all times: but such plants as grow on earthen dykes, which usually begin to vegetate with vigour when the annual rains come on, for the most part retain their verdure at that season almost as well as if they were in good garden-ground.

I have been very particular in regard to this plant; because, in as far as my observations have ye gone, it promises on many accounts to make a most valuable acquisition to the farmer, and therefore justly demands a very particular share of his attention.

3. The *bokus lanatus*, or creeping foft-grasses of Hudson. This is considered by our author as one of the most valuable kinds of meadow-grasses; its pile being exceedingly close, soft, and succulent. It delights much in moisture, and is seldom found on dry ground, unless the soil is exceedingly rich. It is often found on those patches near springs, over which the water frequently flows; and may be known by the uncommon formness and succulence of the blade, the lively light green colour of the leaves, and the matted intertexture of its roots. But, notwithstanding the formness of its first leaves, when the seed-flats advance, they are rough to the touch, so that the plant then affumes a very different appearance from what we were led to expect.

The car is branched out into a great number of segments. This modification somewhat like the oat, but much smaller. This kind of grasses, however, would not be easily cultivated, on account of a kind of soft membrane that makes the seeds adhere to the stalk, and to one another, after they are separated from it, as if they were intermixed with cobweb, so that it is difficult to get them separated from the stalk, or to spread readily in sowing. It spreads, however, so fast by its running roots, that a small quantity sowed very thinly, would be sufficient to flock a large field in a short time.

There are the kinds of *grasses*, properly so called, which have not as yet been cultivated, that Mr Anderson thinks the most likely to be of value; but besides these he recommends the following, of the pastures.

1. Milk-vetch, *lignoreous-vetch*, or milk-wort. This plant, in some respects, very much resembles the common white clover; from the top of the root a great number of shoots come out in the spring, spreading along the surface of the ground every way round it; from which arise a great many clusters of bright yellow flowers, exactly resembling those of the common brome. These are succeeded by hard round pods, filled with small kidney-shaped seeds. From a supposed resemblance of a cluster of these pods to the fingers of an open hand, the plant has been sometimes called *ladies fingers*. By others it is called *crow-toes*, from a fancied resemblance of the pods to the toes of a bird. Others, from the appearance of the blossom, and the part where the plant is found, have called it *feaf*, improperly *fell-broom*. It is found plentifully almost everywhere in old grass-lands; but as every species of domestic animals eat it, almost in preference to any other plant, it is seldom allowed to come to the flower in pasture grounds, unless where they have been accidentally saved from the cattle for some time; so that it is only about the borders of corn-fields, or the sides of inclosures to which cattle have not access, that we have an opportunity of observing it. As it has been imagined that the cows which feed on these pastures, where this plant abounds, yield a quantity of rich milk, the plant has from that circumstance, obtained its most proper English name of *milk-vetch*.

One of the greatest recommendations of this plant is its good quality, that it grows in poor barren ground, where almost no other plant can live. It has been observed in ground too poor, that even heath, or ling (*eica comunes*), would fearfully grow; and upon bare obdurate clays, where no other plant could be made to vegetate; in which the surface remained entirely uncovered, unless where a plant of this kind chance to be established; yet even in these unfavourable circumstances, it flourished with an uncommon degree of luxuriance, and yielded as tender and succulent, though not such abundant floots, as if reared in the richest manured fields. In dry barren lands, also, where almost no other plant could be made to live, it has been found to send out such a number of healthy floots all around as.
The flanks of the milk-vetch are weak and slender, so they spread upon the surface of the ground, unless they are supported by some other vegetable. In ordinary soils they do not grow to a great length, nor produce many flowers; but in richer fields the flanks grow to a much greater length, branch out a good deal, carry few or no flowers or seeds. From these qualities our author did not attempt at first to cultivate it with any other view than that of pasture; and with this intention, sowed it expecting to derive no material benefit from it till he deftined from cutting his field. In this, however, he was agreeably disappointed; the milk-vetch growing, the first season, as tall as his great clover, and forming exceeding fine hay; being scarce distinguishable from lucerne, but by the slenderness of the flanks, and proportional smallness of the leaf.

Another recommendation to this plant is, that it is perennial. It is several years after it is sowed before it attains to its full perfection; but, when once established, it probably remains for a great number of years in full vigour, and produces annually a great quantity of fodder. In autumn 1775, Mr. Anderson cut the flanks from an old plant that grew on a very indifferent soil; and after having thoroughly dried it, he found that it weighed 14 ounces and a half.

The flanks of this plant do not come up in the spring, till the middle, or even the end of May, without endangering the loss of the pasture. This is owing to the height of ten or twelve feet, having very strong stems and roots, which no other vegetable could support themselves without rotting till they attained a great height.

Some other plants, hitherto unnoticed, is recommend ed by our author to the attention of the farmer; viz., the common yarrow, (Achillea millefolium), or hundred-leaved grass. Concerning this plant, he remarks, that, in almost every fine old pasture, a great proportion of the growing vegetables with which the field is covered, consists of it; but the animals which feed there are so fond of the yarrow, as never to allow one field-flank of it to come to perfection. Hence these feed-flanks are never found but in neglected corners, by the fides of roads; and are so disagreeable to cattle, that they are never tasted; and thus it has been erroneously thought that the whole plant was refused by them. The leaves of this plant have a great tendency to grow very thick upon one another, and are therefore peculiarly adapted for pasture. It arrives at its greatest perfection in rich fields that are naturally fit for producing a large and succulent crop of grass. It grows also upon clays, and is among the first plants that strike root in any barren clay that has been lately dug from any considerable depth; so that this plant, and thistles, are usually the first that appear on the banks of deep ditches formed in a clayey soil. All animals delight to eat it; but, from the dry aromatic taste it possesses, it would seem peculiarly favourable to the constitution of sheep. It seems altogether unfit for hay.

Besides these plants, which are natives of Great Britain there are others, which, though natives of other countries, are found to thrive very well in Britain; and have been raised with such success by individuals,
Part I.

AGRICULTURE.

Theory.

...videails, as highly to merit the attention of every farmer. Among these the first place is claimed by lucerne.

This is the plant called medica by the ancients, because it came originally from Media, and on the culture of which they bestowed such great care and pains. It hath a perennial root, and annual stalks, which, in good foil, rise to three feet, or sometimes more in height; its leaves grow at a joint like those of clover; the flowers which appear in June, are purple, and its pods of a screw-like shape, containing seeds which ripen in September. All sorts of domestic cattle are fond of the plant, especially when allowed to eat it green, and black cattle may be fed very well with the hay made from it; but an excess of this food is said to be very dangerous.

Lucerne has the property of growing very quickly after it is cut down, inasmuch that Mr Rocque has mowed it five times in a season, and Mr Anderson affirms he has cut it no less than six times. It is, however, not very easily cultivated; in consequence of which it sometimes does not succeed; and as it dies entirely in the winter, it is perhaps inferior to the fescue grasses already mentioned, which, tho' defiled and neglected, might probably yield as rich a crop as lucerne, without any danger of a miscarriage.

Another grass was brought from Virginia, where it is a native, and fown by Rocque in 1763. This grass is called Timothy, from its being brought from New-York to Carolina by one Timothy Hanlon. It grows best in a wet soil; but will thrive in almost any. If it is fown in August, it will be fit for cutting in the latter end of May or beginning of June. Horfes are very fond of it, and will leave lucerne to eat it. It is also preferred by black cattle and sheep; for a square piece of land having been divided into four equal parts, and one part sowed with lucerne, another with fan-foil, a third with clover, and the fourth with timothy, some horfes, black cattle, and sheep, were turned into it, when the plants were all in a condition for pasturage; and the timothy was eaten quite bare, before the clover, lucerne, or fan-foil, was touched.

One valuable property of this grass is, that its roots are strong and interwoven with one another, so that they render the wettest and softest land, on which a horse could not find footing, firm enough to bear the heaviest cart. With the view of improving boggy lands, therefore, so as to prevent their being poisoned with the feet of cattle, Mr Anderson recommends the cultivation of this kind of grass, from which he has little expectation in other respects.

Sect. VII. Of the Diseases of Plants.

These are divided by Tournefort into the following classes. 1. Those which arise from too great an abundance of juice. 2. From having too little. 3. From its bad qualities. 4. From its unequal distribution; and 5. From external accidents.

Too great an abundance of juices causes at first a prodigious luxuriant growth of the vegetable; so that it does not come to the requisite perfection in a due time. Wheat is subject, in some climates, to a disease of this kind; it vegetates excessively, without ever carrying ripe grain; and the same disease may be artificially produced in any grain, by planting it in too rich a soil. Too much rain is apt likewise to do the same. When a vegetable is supplied too abundantly with juices, it is very apt to rot; one part of it overflows another in such a manner as to prevent the access of fresh air; upon which putrefaction soon ensues, as has been already observed with regard to the fescue grasses.

In grass, or any herbaceous plants, where the leaves are only wanted, this over luxuriance cannot be called a disease, but is a very desirable property; but in any kind of grain, it is quite otherwise. Dr Home, in his Principles of Agriculture and Vegetation, calls the luxuriance in grain among the diseases arising from this cause. He is of opinion, that too great an abundance of juices in a vegetable will produce diseases similar to those occasioned by depletion in animal bodies; viz. flagellations, corruptions, varices, carotises, &c. along with the too great luxuriance we have just now mentioned, which he expresses by "too great an abundance of water-hoofs." Hence he is induced to clas the smut among diseases arising from this cause; it being a corruption happening molt in rainy feasons, and to weak grain. Like other contagious diseases, he tells us, the smut may be communicated from the infected to healthy grain. As a preventative, he recommends steeping the grain in a strong pickle of sea-folk. Besides the effect vented, which this has upon the grain itself, it is useful for separating the good from the bad; the best seed falling to the bottom, and the faulty swimming on the top of the liquor. For the same purpose, a ley of wood-ashes and quicklime is recommended by some; and, by others, a solution of saltpetre or copperas; after which the grain is to be dried with flacked lime, or dry turfs. This solution, however, we can by no means recommend, as it seems most likely to kill the grain entirely.

According to Dr Home, dung is a preventative of Diseases from too great moisture; in confirmation of which, he relates the following experiment. "Two acres of poor ground, which had never got any manure, were follow'd with a design to be fown with wheat; but the scheme being altered, some dung was laid on a small part of it, and the whole fowed, after it had got five furrows, with barley. A great quantity of rain fell. The barley on that part which was dunged was very good; but what was on the rest of the field turned yellow after the rains, and when ripe was not worth the reaping." 74

The want of nourishment in plants may be easily known by their decay; in which case, the only remedy is, to supply them with food, according to the methods we have already directed; or to remove from their neighbourhood such other plants as may draw off the nourishment from those we wish to cultivate.—In the Memoirs of the Academy of Sciences for 1728, Mr Du Hamel mentions a disease, which he calls mortis, that attacks saffron in the spring. It is owing to another plant, a species of trefoil, fixing some violet-coloured threads, which are its roots, to the roots of the saffron, and flocking out its juice. This disease is prevented by digging a trench, which saves all the unaffected plants. The bad qualities, or unequal distributions, of the juices of plants, are the occasion of so few of the diseases to which vegetables in every country are subject, that we forbear to mention them at present. Most of the diseases of plants are owing to external accidents, particularly to the depredations of insects.—The insects by which the greatest devastations are committed in Great Britain are, flies, caterpillars, grubs, and flies. The flies and caterpillars feed on the leaves and young shoots;
AGRICULTURE.

Part I.

Theory.

75. Infests dec.

(by limewater.)

76. Grubs.

77. Turnip fly.

Prevented by fumiga-

tion, &c.

78. Theory.

80. Turnips, when young, are apt to be totally destroyed by a multitude of black flies, from whence called the turnip fly. As a preventative of the same, some advise to mix with brown surf, but this is improper, as brimstone is found to be poisonous to vegetables. The best method seems to be the fumigation of the fields with smoke of half-dried vegetables. For this purpose weeds will answer as well as any. This fumigation must no doubt be often repeated, in order to drive away the innumerable multitudes of these insects which are capable of destroying a large field of turnip. Some have supposed that the fly is either engendered in new dung, or enticed by it; and have therefore advised the manure to be laid on in the autumn preceding, by which it loses all its nutritious qualities, while its nutritive ones are retained, notwithstanding these might be supposed liable to some degree to be exhausted by the sun. This method is said to have been averted by experiments; and it is added, that another material advantage accruing from autumn manuring for turnips is, that all the seeds contained in the dung, and which of course are carried on the land with it, vegetate almost immediately, are mostly killed by the severity of the winter, and the few that remain seldom avoid destruction from the plough-share. The following method has also been recommended as a preventative of the fly:—About Midsummer, take the first opportunity when it rains, or there is an apparent certainty of rain approaching, to sow your turnip seed; if about the full moon, the better. In this case, neither harrow, brush, nor roll, after sowing. The natural heat of the ground at that season, and the consequent fermentation occasioned by copious rain, will give an astonishingly quick vegetation to the seed, which in a few days will be up and out of all danger from the fly. At all events, low not till it rains; it is better to wait a month, or even longer, for rain, than to low (merely for the sake of fowing about the usual time) when the ground is parched with heat. By the scorching of the sun, the oil and vegetable quality of the seed are exhausted; and the few weak plants that come up will be destroyed by the fly before they attain strength to put forth their rough leaves. The fly infests the ground abundantly in dry hot weather, but does no injury in rain. The falling rain will sufficiently wash the turnip-feed into the ground without harrowing it in; which, instead of merely covering, too often buries this small seed so great a depth, as never afterwards to get above ground.

The following remedies are also recommended as having often proved successful:—A small quantity of foot sown over the land at their first appearance. Branches of elder with the leaves bruised, drawn in a grate over them. Musk mixed with the feed before it is sown. And sulphur burnt under it, after moistening it with water in which tobacco has been steeped.

But flowerers on the plants as soon as they appear above ground, are esteemed the best preservatives. They enfeeble and kill the fly, and hasten the plants into the rough leaf, in which state they are out of danger. The sweet smell of the turnip has been thought to attract the fly; upon which supposition, the remedy appeared to consist in overpowering that smell by one which is strong, fetid, and disagreeable. Hence it has been recommended, that upon an acre of turnips sown in the usual way, a peck or more of dry foot be thrown after the ground is finished, and in as regular a way as he sows the feed.

Some time ago an infest, called the corn-butterfly, committed such ravages while in its verminous state, terrify in France, that upwards of 200 parishes were ruined by it; and the ministry offered a reward to the discoverer of an effectual remedy against this destroying worm. The cure which was at last discovered, was to heat the corn, in an oven, so much as not to destroy its vegetative power, but sufficiently to destroy the small worms which made their nest in the substance of the grain, and at last eat out the substance so completely that nothing could be got from the husk, even by boiling it in water. It is certain, that though insects can bear a great deal of cold, they are easily destroyed by a slight degree of heat; nor is the vegetative power of corn easily destroyed, even when kept for a long time in a pretty strong heat. This method must therefore be very effectual for destroying all kinds of insects.
Part I. AGRICULTURE.

The curled disease in potatoes has long been a subject of investigation and experiment among farmers; and the knowledge of its cause and cure forms yet to remain a desideratum. The Agricultural Society at Manchester, a few years ago, offered a premium for discovering by actual experiment the cause of the disease in question; and a great variety of letters were, in consequence, addressed to them upon the subject. As these contain many interesting observations both on the disease itself and the best methods hitherto adopted for preventing it, the following abstracts of them may not improperly be introduced in this place.

I. According to the writer of the first letter, the disease is caused by an insect produced by frosts or bad keeping before setting; and the newest kinds, such as have been raised within these nine or ten years, are most apt to curl, because they will not stand to be kept in winter and spring before setting, as the old kinds will. In autumn 1776, he got up a bed of potatoes to lay by in winter, leaving plenty in the ground as regular as possible; and, before the severity of winter came on, covered part of the bed with straw and peat-haulm, and left the other part of the bed uncovered. That part of the bed which was covered was quite free from curled ones; but the uncovered part produced a great many curled, owing, as the writer says, to frosts and severity of the weather.

II. This writer had about a quarter of an acre of potatoes, well manured with cow and horse dung, and took the greatest care in picking the fine smooth-skinned potatoes for sets; yet nine out of ten parts were curled. He attributes the cause of this disease to a white grub or insect, which he found near the root, about half an inch long, with eight or ten legs, its head brown and hard; as upon examining a number of the curled roots, he found them all bitten, chiefly from the surface to the root, which of course stopped the progress of the sap, and threw them into a curl. The uncurled roots were not bitten. He tried a few experiments as follow:—First, he put foot to the insects in the rows for two days; and after that, he put lime to them for the same time, but they still kept lively; next he put a little salt, which destroyed them in a few hours. From which he infers, that if coarse salt were put into the ground at the time the land is preparing for potatoes, it would effectually cure this disemmerer.

III. In this letter, the cause of the disease is attributed to the method of earthing the stems while in cultivation; and the branches, striking root into the new earthed-up soil, it is said, produces potatoes of such a nature as the year following to cause the disease complained of.

To prevent the disease, it is recommended to take the sets from those potatoes that have not bred any from the branch covered; or otherwise, to dig the part the sets are to be raised from.

IV. According to this writer, the disorder proceeds from potatoes being set in old-tilled or worn-out ground; for though those potatoes may look tolerably well, yet their sets will molt, if not, produce curled potatoes. Hence he is convinced, that no sets ought to be used from old-tilled or couch-grass land; and that, in order to have good sets, they should be procured from land that was purposely followed for them; from fresh ley land where they are not curled; or from ley land that was burnt last spring. He directs to plant them on virgin mould, and the potatoes will have no curled ones among them; and to keep them for winter, from any other kind.

To avoid the uncertainty of getting good sets, he recommends crabs to be gathered from potatoes growing this year on fresh land free from curl, and the next spring to sow them on fresh ley land; and continue to plant their sets on fresh ley land yearly, which he is convinced will prevent the curl.

All the good potatoes he saw this year, either on fresh ley land or on old-tilled land, were raised from sets that grew upon fresh ley land last year; and where he has seen curled potatoes, he found, upon inquiry, the potato-sets grew upon old-tilled and worn-out land last year. He gives as a general reason for the disorder, that the land is oftener curbed than it had used to be, much more corn being now raised than formerly.

V. In 1772, this writer planted some potatoes by accident full nine inches deep; when taken up, many of the plants were rotted, and a few curled. He kept the whole produce for feed, and planted two acres with it in 1773, not quite six inches deep. The crop was amazingly great; and he did not observe any curled plants among them. In 1774, many of these were planted in different soils; yet they were not infected with the curled disease, that not one in twenty escaped. In 1775, the complaint of this disease became general. In 1776, it occurred to him that the good crop of 1773 was owing to the accidental deep setting of 1772; and that the reason why the same seed became curbed in 1774, was their being set so near the surface in 1773; and attributes the disease to the practice of ebb-setting. In 1777, he took some potatoes from a crop that was curled the year before, and after cutting the sets, left them in a dry room for a month. Half were planted in ground dug fourteen days before; the other half, having been steeped in a brine made of whitters ashes for two hours, were also planted in the same land at the same time. The steeped ones came up ten days before the others, and hardly any misseed were curled. The unsteeped ones generally failed, and those few that came up were mottly curled.

He therefore advised as a remedy, 1. That the potatoes intended for next year's sets be planted nine inches deep. 2. That they remain in the ground as long as the season will permit. 3. That these sets be well defended from frosts till the beginning of March. 4. That the sets be cut a fortnight before planting. 5. That they be steeped, as above, two hours in brine or ley. 6. That the dung be put over the sets. And 7. That fresh sets be got every year from sandy soils near the coast, or on the shore.

P.S. At planting, the hard dry sets should be cast aside, for they will probably be curbed. Curled potatoes always proceed from sets which do not rot or putrefy in the ground.

VI. This writer had five drills of the old red potatoes, and four of the winter whites, growing at the same time in the same field. The drills were prepared exactly
He allows, that the curl has frequently happened to persons who have used large potatoes for sets; for, as all roots are not equally affected, some curled ones may be mixed with the rest.

To prevent the evil, cut your sets from clean and middle-sized potatoes, gathered from places as clear of the curl as possible; preferve them as usual till spring.

If any are harder or grafter in cutting than usual, caft them aside. He would also recommend the raising a fresh fort from the crap produced on the forts least affected, which in Lancashire are the long-duns.

X. Set potatoes with the sprits broke off, and they will (says the writer of this letter) be curled ones; if set with the sprits on, they will not be curled. Again, take a potato which is sprit, and cut a set off with two lights: break one sprit off, and let the other stay on, and set it; the former will be curled, and the latter will not.

When you have holed your potatoes, take them out, before they are sprit, and lay them dry until you have set or sown them, and you will have no curled potatoes.

XI. This writer was at the expense of procuring sets at fifty miles distance, and where this disease was not known. The first year’s trial was successful; the year following he procured sets from the same place, but one-fifth of his crop was infected. By way of experiment, he planted sets from roots which had been infected the year before, and some of these produced, healthy plants, free from all infection. As every effect must have a cause, he supposed it might be some infect, which, living on the leaves, gave them a curled and sickly appearance, as is the case in the leaves of many shrubs and trees. But whether the infect is lodged in the old sets, and to be destroyed at the time of planting, or, proceeding from some external cause, can only be destroyed afterwards, he is not yet certain, although he has made the following experiments.

On a piece of ground that had not been dug for 20 years, he planted four rows of sets, which he knew to be perfectly clear; the drills were two feet distant, the sets one foot distant in each drill. He then planted on the same ground four rows with sets from curled potatoes at equal distances; in each row were about 20 sets.

Lot 1st, the curled flare.

No. 1. Without manure, | No. 3. In foot.

2. In salt. | 4. In quicklime.

Lot 2d, the clear sets.

No. 1. Without manure. | No. 3. In foot.

2. In salt. | 4. In quicklime.

These planted in salt and foot in both lots were destroyed. In lot 1, 2d, and 3d, all curled. Lot 2, 1d, and 4d, which is clear.

This experiment was made on a supposition that the infect lodged in the set, and must be destroyed by planting. But of that he is not fully satisfied. He repeated salt, foot, and quicklime, on the branches of several curled potatoes. Salt destroyed all he touched with it. Lime and foot had, he thought, a partial effect on the plants. After some time, they appeared almost as healthy as the rest. Thus, although he had done little towards the cure, he flatters himself he has pointed
Part I.

AGRICULTURE.

Theory.

pointed out the cause, the infects on the curled plants being not only very numerous, but visible to the naked eye.

XII. This writer ascribes the cause of the disease to the fruit, and keeps in winter and spring before setting. They are liable to be damaged by frost after they are set, but may be prevented by covering. If it be asked, why frost did not injure them formerly? he answers, it is only the new kinds which are apt to curl. To this may be added, that leaf care is now taken of the feed than formerly. To prevent the latter, let them remain in the ground covered with haulm or litter, till the time they are wanted for setting; and, in case no haulm touches them afterwards, they will be free from the disease.

XIII. This writer says, the red potato was as generally planted as the winter-white and the Lincolnshire kidney are now. The first, being a later potato, did not sprout so early as the others. The white sprouts very early, and therefore should first be moved out of the place where they have been preserved in the winter. Instead of that, they are often let remain till their roots and sprouts are matted together. On separating them, these sprouts are generally rubbed off, and they are laid by till the ground is ready; during which interval they sprout a second time: but these second sprouts, being weak and languid, will shrivel, ficken, and die; and the fruit at the roots will be small, hard, ill-shaped, and of an brown colour.

Now, if putting off the sprouts once or more, before the sets are put in the ground, be the cause (as he verily believes it is) of the curled disease, an easy remedy is at hand. When the potatoes intended for sets are dug up, lay them in a well aspeck as dry as possible: in such a situation they will not sprout so soon. The best time for removing most forts, is the first fine day after the 24th of February. Cut them into sets as soon as possible, and let them remain covered with dry fand till the ground is prepared, which should be a winter fallow. Lay the sets in without breaking off any of the sprouts, for the second will not be so vigorous. This accounts for one sprout out of three from the same set being curled. The two items not curled arose from two later eyes, and were first sprouts. The sprout curled was a second, the first having been rubbed off.

XIV. This writer says, that last spring one of his neighbours cut and set, in the usual way of drilling, some loads of the largest potatoes he could procure; and more than half of them proved curled. Being a few sets short of the quantity wanted, he planted some small potatoes which he had laid by for the pigs. These being fully ripe and solid, there was not a curled plant among them. He apprehends, the others being curled was owing to their not being fully ripe. A crop of potatoes, set this year in rows on ground that bore a crop of them last year, were mostly curled; but many plants came up from seed left in the ground last season, and there was not a curled one among them.

XV. Of late years, this writer says, great improvements have been made in setting potatoes and cutting the sets. The ground is dried cleaner and dunged stronger. Many people, in drilling, wrap up the sets entirely in the dung; by which means, though their potatoes are larger, the disease seems to be increased. They also cut their sets out of the richest and largest potatoes, which is perhaps another cause of this evil. In cold countries, where they set their own feed, which has grown on poor land, with least dung, they have no curled plants. On the contrary, when they bought rich and large potatoes for feed, they have been curled in great quantities. He believes, the richness and largeness of the feed is the cause of the evil; for he does not remember to have seen a curled plant which did not spring from a set of a large potato.

XVI. This writer apprehends the curled disease in potatoes to proceed from a defect in the planta feminalis, or feed-plant; and from comparing curled ones with others, there appeared to be a want of, or inability in, the powers of expanding or unfolding the parts of the former; which, from this defect, forms thrivelled, flared, curled fnts. On examining some of the sets at the time of getting the crop, he found them hard and undecayed; so hard, indeed, that some of them would not be soft with long boiling. This led him to think, that some manures might have the same effect on them as tanners oose has on leather, and so harden them. The embargo plant could not come forth with ease; but a closer examination taught him otherwise, and that they grow equally in all manures.

Some have thought that the fermentation is occasioned by too great quantities being heaped together; but the writer has seen an instance, wherein a single potato, preferred by itself, when set, produced fnts of the curled kind. He thinks the most consistent and rational opinion is, that the disease is occasioned by the potatoes being taken from the ground before the faments, or miniature-plant, is properly matured and ripened.

For let it be observed, that the potato, being a native of a warmer climate, has there more fun, and a longer continuance in the ground, consequently, it has not the same natural causes in a cold climate to mature the feed-plant as in its native state. All the opportunities, therefore, ought to be given in which the climate will admit for nature to complete her work, and fit the faments for the next state of vegetation, especially in those intended for feed. But if the potato be taken up before the feed-plant is fully matured, or the air and sap-veffels have acquired a proper degree of firmness or hardness, it must, when thus robbed of further nutrition, shrivel up; and when the vellels, in this immature state, come to act again in the next state of vegetation, they may produce plants which are curled.

If it be asked, why are they more common now than formerly? he answers, that before the present mode of setting them took place, people covered them, while in the ground, with straw, to protect them from frost.

If it be asked, why one set produces both curled and smooth sets? he answers, we suppose every eye to contain a planta feminalis; that all the embryos, or feed-plants, contained in one potato, are nourished by one root; that, as in ears of corn, some of these feed-plants may be nourished before others.

One of his neighbours, last year, set two rows of potatoes.
AGRICULTURE.

The head is that part of the plough which goes in the ground; therefore the fleshy and narrow over it is, the friction will be the less, and the plough more easily drawn; but the longer the head is, the plough goes more readily, and is not so easily put out of its direction by any obstructions that occur. Twenty inches is considered as a mean length; and five inches is the most convenient breadth.

The sheath, E, is driven into the mortoise, and thus fixed to the head A B. It is not perpendicular to the head, but placed obliquely, so as to make the angle formed by the lines A B and E B about 60 degrees. The sheath is about 3 inches long, besides what is driven into the mortoise (fig. 1); about three inches broad, and one inch thick. The sheath is fixed to the mould-board, as in fig. 11. E, in the same manner as the wreft is fixed to the head in fig. 7.

The mould-board, is designed to turn over the earth of the furrow made by the plough; and it is obvious, that, according to the position of the sheath, the mould-board will turn over the earth of the furrow more or less suddenly. Besides, when it forms a less angle with the head than 60 degrees, the plough is in great danger of being checked, as the farmers term it.
Part II. AGRICULTURE.

The Larger Handle, F A, is fixed to the head, by driving it into the mortise of (fig. 1.). It is placed in the same plane with the head; and its length from A F is about five feet four inches, and its diameter at the place where it is fixed to the beam is about two inches and a half, and tapers a little to the top F. About ten inches from A, there is a curve in the handle, which, when F is raised to its proper height, makes the lower part of it nearly parallel to the sheath E B. This curve is designed to strengthen the handle. The proper position of the handle is, when the top F is about three feet two inches higher than the bottom of the head A B.

The longer the handles, the plough is the more easily managed, because the levers are more distant from the centre of motion. The higher the top of the handles, the plough is more easily raised out of the ground, provided they be no higher than the lower part of a man's breast.

The Beam, is fixed to the larger handle and the sheath, all of which are placed in the same plane with the head. The length of it, from H to I, is about six feet; its diameter is about four inches. When the plough is in the ground, the beam should be just high enough not to be accompanied by any thing on the surface.

The position of the beam depends on the number of cattle in the plough. When two horses are yoked, the beam should be placed in such a manner as to make the perpendicular distance between the bolt-hole of the beam and the plane of the head about 21 inches; when four horses are yoked, two a-broad, this distance should only be about 18 inches.

The Sock, B P, is fixed to the end of the beam, and is about two feet long. In fitting the Sock to the head, the point ought to be turned a little to the land or left side; because otherwise it is apt to come out of the beam altogether. When turned to the left, it likewise takes off more land; when turned upwards, the plough goes shallow; and when downwards, it goes deeper.

The Coultre, is fixed to the beam, and is about two feet ten inches long, two inches and a half broad, sharp at the point and before, and thick on the back, like a knife. It is fixed and directed by wedges, so as to make the point of it equal to, or rather a little below the handle, and is fixed and directed to the beam by two bolts, and has notches by which the coultre may be fixed either above or below the beam. A D is the fore-bolt upon which the coultre turns; and B C are four notches, between which the coultre is turned to the right or left of the beam.

The Wreft, B D, is fixed to the head, and is about 26 inches long, two broad, and one thick. It is fixed to the head at B, in such a manner as to make the angle contained between the lines A B and B D about 25 degrees. Two hands are seldom or never placed in the same plane with the head, but gradually raised from the place where it is fixed to it, that is, from B to K, as in fig. 8. The position of the wret determines the nature of the furrow. When the wret is wide and low the furrow is wide; and when it is narrow and high the furrow is narrow.

Fig. 9. represents the two Handles, fixed together by the two rungs. The larger handle has already been described: the lesser one is a few inches shorter, and does not require to be quite so strong. The distance of the handles at the little rung depends on the position of the wret. Their distance at M and P is about two feet six inches. The lesser handle is fixed to the mould board at M, fig. 10, and to the wret K B, at L.

The Bridle, or Muzzle, is another article belonging to the plough. It is fixed to the end of the beam, and the cattle are yoked by it. The muzzle commonly used is a curved piece of iron, fixed to the beam by a bolt through it. A B C is the muzzle, A C the bolt by which it is fixed to the beam; D is the swingle-tree or croft-tree, to which the traces are fixed; and B is a hook, or cleat, as it is commonly called, which joins the muzzle and swingle-tree.

Some use another kind of muzzle, A B C D. It is fixed to the beam by two bolts, and has notches by which the cleek of the swingle-tree may be fixed either to the right or the left of the beam. There are also different holes for the hind-bolt to pass thro', by which the draught may be fixed either above or below the beam. A D is the fore-bolt upon which the muzzle turns; and B C are four notches, between which any two of which the cleek of the swingle-tree may be fixed. When the cleek is fixed at B, the plough is turned towards the farm land, and takes off a broader furrow; and when fixed at C, it is turned towards the ploughed land, and takes off a narrower furrow. E and F are the holes on each side thro' which the hind-bolt passes. When the ball is put thro' the highest two, the holes being thereby brought to the middle of the beam, the fore-part of the muzzle is raised above the beam, and the plough is made to go deeper; and when put through the lowest two, the fore-part of the muzzle is sunk below the beam, and the plough is made to go shallower. This muzzle may be so constructed as to have the same play with the common one. A is the end of the beam; B a plate of iron fixed into it, and with a similar one in the other side, is riveted into it by bolts; C is the muzzle fixed to these plates of iron by the bolt D, which bolt may be put through any of the holes E E. From the contruction of this muzzle it is plain, that it has the same play with the common one, and that by it the land of the plough may be altered at pleasure.

Of all forms, that of the Scotch plough is the best. Properties of the Scotch plough, especially where stones abound; and no less fit for strong clays than ploughs hardened by drought. The length of its head gives it a firm hold of the ground; its weight prevents it from being thrown out by stones; the length of the handles gives the ploughman great command to direct its motion.
AGRICULTURE.

Part I.

Practice; and by the length of its head, and of its mould-board, it lays the furrow-line cleverly over. This plough was contrived during the infancy of agriculture, and was well contrived: in the soils above described, it has not an equal.

In what soil improper.

But a tender foil, it is improper, because it adds greatly to the expense of ploughing, without any counterbalancing benefit. The length of the head and mould-board increases the friction, and consequently it requires a greater number or oxen or horses than are necessary in a shorter plough. There is another particular in its form, that resists the draught: the mould-board makes an angle with the stock, instead of making a line with it gently curved backward. There is an objection against it no less solid, that it does not stir the ground perfectly: the hinder part of the wret rifes a foot above the sole of the head; and the earth that lies immediately below that hinder part, is left unfurried. This is ribbing land below the surface, similar to what is done by ignorant farmers on the surface.

These defects must be submitted to in a foil that requires a strong heavy plough; but may be avoided in a cultivated foil by a plough differantly constructed. Of all the ploughs fitted for a cultivated foil free of stones, that introduced into Scotland about 20 years ago, by James Small in Blackadder Mountain, Berwickshire, is the best. It is now in great request; and with reason, as it avoids all the defects of the Scots plough. The shortness of its head and of its mould-board lessen the friction greatly; from the point of the stock to the back part of the head it is only 30 inches: and the whole length, from the point of the beam to the end of the handles, between eight and nine feet. The stock and mould-board make one line gently curving; and consequently gather no earth. Instead of a wret, the under edge of the mould-board is in one plain with the sole of the head; which makes a wide furrow, without leaving any part unfurried. It is termed the chain-plough, because it is drawn by an iron chain fixed to the back part of the beam immediately before the coulter. This has two advantages: first, by means of a mizzle, it makes the plough go deep, or shallow; and second, it stiffens the beam less than if fixed to the point, and therefore a flenderer beam is sufficient.

This plough may be well considered as a capital improvement; not only by saving expence, but by making better work. It is proper for loams; for coarse-clays; and, in general, for every sort of tender foil free of stones. It is even proper for opening up pasture-ground, where the soil has been formerly well cultivated.

A feathered stock is used in the Scotch plough. The difference between it and the feathered stock will be best understood by comparing their figures. Fig. 14, is the common stock, and fig. 15, the feathered one.

From the construction of the feathered stock, it is obvious, that it must meet with greater resistance than the common fock. However, when the plough takes off the earth of the furrow broader than that part of the fock which goes upon the head, it is more easily drawn than the plough with the common fock; for the earth which the common fock leaves to be opened by the wret, is more easily opened by the feather of the other fock. In ley, the feathered fock makes the plough go more easily, because the roots of the grass, which go beyond the reach of the plough, are more easily cut by the feather, than they can be torn afunder by the common fock. The feathered fock is also of great use in cutting and destroying root-weeds. The common fock, however, answers much better in strong land.

It is proper here to add, that in fitting the feathered fock to the head, the point of it should be turned a little from the land, or a little to the right hand.

If we look back 30 years, ploughs of different constructions did not enter even into a dream. The Scotch plough was universally used, and no other was known. There was no less ignorance as to the number of cattle necessary for this plough. In the south of Scotland, six oxen and two horses were universal; and in the north, ten oxen, sometimes 12. The first attempt to lessen the number of oxen was in Berwickshire. The low part of that county abounds with stone, clay, and marl, the most substantial of all manures, which had been long used by one or two gentlemen. About 25 years ago it acquired reputation, and spread rapidly.

As two horses and two oxen were employed in every marl-cart; the farmer, in summer-fallowing, and in preparing land for marl, was confined to four oxen and two horses. And as that manure afforded plenty of succulent straw for oxen, the farmer was surprized to find that four oxen did better now than six formerly. Marling, however, a laborious work, proceeded slowly, till people were taught by a noted farmer in that county, what industry can perform by means of power properly applied. It was reckoned a mighty talk to marl five or six acres in a year. That gentleman, by plenty of red clover for his working-cattle, accomplished the marling 50 acres in a summer. That gentleman, by plenty of red clover for his working-cattle, accomplished the marling 50 acres in a summer. That gentleman, by plenty of red clover for his working-cattle, accomplished the marling 50 acres in a summer. That gentleman, by plenty of red clover for his working-cattle, accomplished the marling 50 acres in a summer.

Having so much occasion for oxen, he tried with success, two oxen and two horses in a plough; and that practice became general in Berwickshire.

Advantages of the chain-plough. The great friction occasioned in the Scotch plough by a long head, and by the angle it makes with the mould-board, necessarily requires two oxen and two horses, whatever the soil be. The friction is so much less in the chain-plough, that two good horses are found sufficient in every soil that is proper for it. Besides, the reducing the draught to a couple of horses has another advantage, that of rendering a driver unnecessary. This saving on every plough, where two horses and two oxen were formerly used, will, by the strictest computation, be L. 15 Sterling yearly; and where four horses were used, no less than L. 20 Sterling.

There is now scarce to be seen in the low country of Berwickshire a plough with more than two horses, which undoubtedly in time will become general. We know not of one further improvement, that of using two oxen instead of two horses. That draught has been employed with success in several places; and the saving is so great, that it must force its way everywhere. It may be confidently affirmed, no soil firred in a proper season, can ever require more than two horses and two oxen in a plough, even supposing it the stiffest clay. In all other soils, two good horses, or two good oxen abreast, may be relied on for every operation of the chain-plough.

A chain-plough of a smaller size than ordinary, drawn
Part II. AGRICULTURE.

Practice.

A small single-horse plough, drawn by a single horse, is of all the most proper for horse-hoeing, supposing the land to be mellow, which it ought to be for that operation. It is sufficient for making harrows to receive the dung, for ploughing the drills after dunging, and for hoeing the crop.

A still smaller plough of the same kind may be recommended for a kitchen-garden. It can be reduced to the smallest size, by being made of iron; and where the land is properly dressed for a kitchen-garden, an iron plough of the smallest size drawn by a horse will save much fpade-work. In Scotland, thirty years ago, a kitchen-garden was an article of luxury merely, because at that time there could be no cheaper food than oatmeal. At present, the farmer maintains his servants at double expense, as the price of oat-meal is doubled; and yet he has no notion of a kitchen-garden more than he had thirty years ago. He never thinks, that living partly on cabbage, kail, turnip, carrot, would save much oat-meal: nor does he ever think, that change of food is more wholesome, than vegetables alone, or oat-meal alone. We need not recommend potatoes, which in feanty crops of barley, where the land is light and drained, have proved a great blessing: without them, the labouring poor would frequently have been reduced to a starving condition. Would the farmer but cultivate his kitchen-garden with as much industry as he bestowed on his potato crop, he need never fear want; and he can improve. A very small expense would inclose an acre for a kitchen-garden to each of his tenants; and it is the landlord who ought to give a beginning to the potatoe crop, he need never fear want; and he can make his potatoe crop, he need never fear want; and he can

Nor is this the only case where a single-horse plough may be profitably employed. It is sufficient for feeding barley, where the land is light and well-dressed. It may be used in the second or third ploughing of fallow, to encourage annual weeds, which are destroyed in subsequent ploughings.

The Rotheram Plough, Plate VII, Fig. 3.

The Rotheram plough is a machine of very simple construction, and easily worked. AB is the beam, CD the shaft, EBD the main handle, FR the smaller handle, GH the coulter, KI the fork or share, NP the bridle, S the fly-band, and ML a piece of wood in place of a head. The whole of this plough should be made of ash or elm; the irons should be fleeced and well-tempered; and that part of the plough which is under ground in tilling should be covered with plates of iron. The difference between this and the common plough seems to confit in the bridle at the end of the beam, by which the ploughman can give the plough more or less land by notches at N, or make it cut deeper or shallower by the holes at P; in the coulter or share, which are fo made and set as to cut off the new furrow without tearing; and in the mould-board, which is fo shaped at first to raise a little, and then gradually turn over the new cut furrow with very little refiistance. But the greatest advantage attending it, is its being fo easy of draught, that it will do double the work of any common plough.

The Paring plough is an instrument used in several parts of England for paring off the surface of the ground, in order to its being burnt. Mr Bradley has given the following description of a very simple instrument of this kind: From A to A (fig. 15) is the plough-beam, and a paring about seven feet long, made out of the block B, which is of clean timber. FK, CC are the sheaths or standards, made out of the ins. GID is the paring plate, and fastened to it with a bolt and key on each side, as at D. E is the paring plate of iron laid with steel, about four inches wide, and from 12 to 18 inches long. This plate must be made to cut on the sides, which are bolted to the standards as well as at the bottom part. FF are two iron braces to keep the standards from giving way: these standards must be mortised near the outsides and through the block. GG are the plough handles, which must be fixed slope-ways between the beam and the standards. The pin-holes in the beam, the use of which is to make the plough cut more or less deep, by fixing the wheels nearer to or farther from the paring plate, should not be above two inches

Fig. 1 represents the four-coultled plough of Mr Tull. Its beam is ten feet four inches long, whereas that of the common plough is but eight. The beam is straight in the common plough, but in this it is straight only from a to b, and thence arched: so that the line let down perpendicularly from the corner at a, to the even surface on which the plough stands, would be 11 inches; and if another line were let down from the turning of the beam at b to the same surface, it would be one foot eight inches and a half; and the third line let down to the surface from the bottom of the beam at that part which bears upon the pillow, will show the beam to be two feet ten inches high in that part. At the distance of three feet two inches from the end of the beam a, at the plough-tail, the first coulter, or that next the share, is let through; and at 13 inches from this, a second coulter is let through: a third at the same distance from that; and, finally, the fourth at the same distance from the third, that is, 13 inches: and from a to b is seven feet.

The crookedness of the upper part of the beam of this plough is contrived to avoid the too great length of the three foremost coulters, which would be too much if the beam was straight all the way; and they would be apt to bend and be displaced, unless they were very heavy and clumsy. Ash is the best wood to make the beam of, it being sufficiently strong, and yet light. The beam in this plough is to be seven inches broad. The fixing of the share in this, as well as in the common plough, is the nicest part, and requires the utmost art of the maker; for the well-going of the plough wholly depends upon the placing this. Supposing the axis of the beam, and the left side of the share, to be both horizontal, they must never be set parallel to each other: for if they are, the tail of the share bearing against the trench as much as the point, would cause the point to incline to the right hand, and it would be carried out of the ground into the furrow. If the point of the share should be set fo, that its side should make an angle on the right side of the axis of the beam, this inconvenience would be much greater; and if its point should incline much to the left, and make too large an angle on that side with the axis of the beam, the plough would run quite to the left hand;
AGRICULTURE.

Plate VI.

The different parts of this instrument are represented by No 1, 2, 3 of fig. 6. A A &c. a square frame 3 feet 4 inches from the fore to the hind part, by 4 feet 3 inches, the breadth of the machine within side; the timber (when of fir) 4 inches square, placed on two wheels B B. 3 feet diameter, a little more or less (the old fore-wheels of a chaise may answer the purpose), to support the hind part of the machine.

C C &c. are fixed strong pieces of wood, called bulls, 3 feet long, 5 inches and a half broad, the thickness 6 inches at E. and tapering to 3 inches at F. Into these bulls are fixed the cutting wheels, which are iron, 13 inches diameter, 3 lbs. of an inch thick at the centre, about an inch diameter for piercing holes to fix the iron axles in; from that they are to be of such thickness, as allow the edges to be well steel'd. The wheels are fixed by two bolts going through the bulls, with eyes on one end for the axles of the wheels to run in, and nuts and ferrules on the other to make them very firm and fast in the bulls, to prevent their interfering with the weights L L &c. resting on them.

G G. &c. are hollow pieces of wood, called thistles, each 3 inches long, which include the bolts M M. and keep the bolts C C &c. at their proper distances, but may be made longer or shorter at pleasure, according as the sward requires to be cut in larger or smaller pieces. They are in two pieces bound together, and joined by a strap of leather or cord, which allows them to be readily changed when the cutting wheels require to be kept at more or less distance.

The iron bolt M M. goes through two pieces of wood or iron P. P. 7 inches long, clear of the wood, supported by iron stays fixed to the frame, and through all the bulls. It requires to be strong, as the draught of the horses terminate there.

H H. No 2. and 3. a cylinder or segment of wood, 7 inches diameter, called a rocking tree, which goes across the frame, and moves on the pivots fixed into it, one at each end, supported by an iron bolt or piece of wood mortised into the frame, 8 inches high, as appears in No 2. and 3. to which 6 chains or ropes are fixed by hooks, at different distances, as you want your cuts, 9, 8, 7, or 6 inches from one another, and are joined to the end of each bull in which the cutting wheels run; so that when the rocking tree is turned about by the lever I. fixed in the middle of it, all the bulls, with their cutting wheels, are raised out of the ground at once, as in No 3. by which means the machine may be turned, or moved from place to place with great ease, without any danger of straining the wheels.

L L L. &c. No 1. 2. 3. are weights of treefunito, 26 inches long and 6 inches broad; the under one 4 inches thick, the upper one 3 inches thick; weighing about 64 lb. the under, and 48 the upper; each of them having two holes, through which iron spikes, firmly fixed in the bulls, pass, in order to keep them steady.

When the ground is easily cut, the under stone may answer; when more difficult, the other stone may be added; so that every wheel may have 7 stone-weight upon it, which has been found sufficient for the stiffest land and toughest sward the machine has ever been tried on. Cast iron weights will answer fully better, but are more expensive.

The lever I. No 2, 3. which ought to be 5 feet long, must have a sliding rope on it; fixed to the back part of the frame; so that when the cutting wheels are all taken out of the ground three or four inches, by the rocking tree's being turned partly round by the lever, the rope may be fixed to it by a loop over the pin R. No 3. (it ought to be placed 3 feet 4 inches from the extremity of the lever I.) Thus all the cutting wheels are kept out of the ground till the machine is turned; and then by moving the loop off the pin, it flips back towards the frame, and the lever is gently let back to its place, as in No 2. by which the cutting wheels are put into their former posture, by the weights fixed on the bulls in which they run. The levers may be made of good tough ash.

P. P. No 1.
to which the sward-cutter, consisting of four, six, or more cutting wheels, is never liable, from these being entirely independent of one another, cutting the ground across the ridges before ploughing, and rendering that operation easier to two horses than it would be to three without its being cut. The furrow being cut across, falls finely from the plough in squares of any size required not under six inches, in place of long fiss of tough sward feld and imperfectly broke by the four-coulered plough.

This instrument is very fit for preparing ground for burn-bating, as it will save much hand-labour.

It may be properly used in crofs-cutting clover of one or two years standing, to prepare the ground for wheat, if the land is stiff and moist enough.

It may be applied to cutting and crofs-cutting pasture-ground, intended to have manure of any kind put upon it to meliorate the grafs. In this it will far exceed the scarificator mentioned in one of Mr Young's tours; as that instrument is liable, as well as the four-coulered plough, to be thrown out of its work when meeting with a stone or other interruption. This the sward-cutter is proof against, which is looked on as its greatest excellence.

In preparing for barley, the sward-cutter excels a roller of any kind in reducing the large hard clods in clay land, occasioned by a sudden drought, after its being ploughed too wet; and it is likewise very proper for reducing such clay land when under a summer-fallow. In this operation, the sward-cutter is greatly to be preferred to the cutting-roller, likewise mentioned by Mr Young in one of his tours; for, the wheels of the latter being all dependent on another, when one is thrown out by a stone, three or four must share the same fate. Besides, the cutting-roller has but few wheels in fix feet; whereas the sward-cutter has fix in four feet three inches, at nine inches distance; and, if necessary, may have them so near as fix inches.

After old grafs-ground is cut across with the sward-cutter and ploughed, it has a very uncommon and worklike appearance, from each square turned over by the plough being raised up an inch or two at the side left moved by the earth-board; so that the field, when finished, is all prettily waved, and resembles a piece of water when blown on by a gentle breeze. By this means a very great deal of the land's surface is exposed to the frost and other influences of the air, which cannot fail to have a good effect on it.

Two horses are sufficient for the draught of a double-horse sward-cutter, and one horse for a single-horse one. One man manages the machine and drives the horses. He begins his operation by first measuring off 20 or 30 paces from the machine, less or more as he inclines, and there fixes a pole. He then cuts the field crofs, as near at right angles with the ridges as he can. When the cutting wheels are past the last furrow about a yard or so, and the machine is upon the outmost ridge of the field on which it must turn, he must stop the horses; then take hold of the lever 1. No. 2. and by pulling it to him he raises the cutting wheels out of the ground, which are kept to by the loop of the rope being put over the pin R. in the lever 1. No.3. till the machine is turned and brought to its proper place, which is done by measuring off the same distance for-
The cutting wheels are exactly over the outmost furrow, then, on the horces being stopped, the rope is flit off the pin \( R \), and the lever returned to its former place, as represented \( N \), which holds the weights L. L. &c. to force the cutting wheels into the ground again. He then goes on till the interval between the first and second stroke of the machine is all cut. In this manner the field is to be finished, after which you may begin to plough when you please. (N. B. There must be a pole at each side of the field.

It is of no consequence whether the land to be fward-cut is in crooked ridges or straight, in flat ridges or in very high raised ones. Be the surface ever so uneven, the cutting wheels, being all independent of one another, are forced by their weights into every furrow or hollow.

One fward-cutter will cut as much in one day as six ploughs will plough.

The land may lie several months in winter after being fward-cut, when there is no vegetation to make the cuts grow together again, but the sooner it is ploughed after cutting the better, that it may have the benefit of all the winter's frost, which makes it harrow better in feed-time.

When the ground is harrowed, the harrows ought to go with the waves which appear after ploughing, not against them, as by that means they are less apt to tear up the furrows all into squares. This, however, need only be attended to the two first times of harrowing, as they are called.

Any common wright and smith may make the instrument. It is very strong, very simple, and easily managed and moved from place to place; and, if put under cover, will last many years.

It was invented some time ago by the honourable Robert Sandilands; and is represented in the Plate as it has been lately improved by him, the price being at the same time reduced from L. 15 or L. 16 to L. 5 or L. 6.

3. The Brake.

The brake is a large and weighty harrow, the purpose of which is to reduce a stubborn soil, where an ordinary harrow makes little impression. It consists of four square bulls, each side five inches, and six feet and a half in length. The teeth are 17 inches long, bending forward like a coulter. Four of them are inserted into each bull, fixed above with a screw-nut, having 12 inches free below, with a heel close to the under part of the bull, to prevent it from being pulled back by flanes. The nut above makes it easy to be taken out for sharpening. This brake requires four horses or four oxen. One of a different size will not answer the purpose; one of a larger size will require six oxen: in which case the work may be performed at less expense with the plough.

This instrument may be applied to great advantage in the following circumstances. In the following strong clay that requires frequent ploughings, a breaking between every ploughing will pulverize the soil, and render the subsequent ploughings more easy. In the month or March or April, when strong ground is ploughed for barley, especially if bound with couch-grafs, a cross-breaking is preferable to a cross-ploughing, and is done at half the expense. When ground is ploughed from the state of nature, and after a competent time is cross-ploughed, the brake is applied with great success, immediately after the cross-ploughing, to reduce the whole to proper tith.

Let it be observed, that a brake with a greater number of teeth than abovementioned, is improper for ground that is bound together by the roots of plants, which is always the case of ground new broken up from its natural state. The brake is soon choked, and can do no execution till freed from the earth it holds. A less number of teeth would be deficient in pulverizing the soil.

4. The Harrow.

HARROWS are commonly considered as of no use but to cover the seed; but they have another use scarce less essential, which is to prepare land for the seed. This is an article of importance for producing a good crop. But how imperfectly either of these purposes is performed by the common harrow, will appear from the following account of it.

The harrow commonly used is of different forms. Imperfections of the common harrow.

The first we will mention has two bulls, four feet long and 18 inches square, with four wooden teeth in each. A second has three bulls and 12 wooded teeth. A third has four bulls, and 20 teeth of wood or iron, 10, 11, or 12 inches square. Now, in fine mould, the last may be sufficient for covering the seed; but none of them are sufficient to prepare for the seed any ground that requires subduing. The only tolerable form is that with iron teeth; and the bare description of its imperfections will show the necessity of a more perfect form. In the first place, this harrow is by far too light for ground new taken up from the state of nature, for clays hardened with spring-drought, or for other stubborn soils: it floats on the surface; and after frequent returns in the same furrow, nothing is done effectually. In the next place, the teeth are too thick set, by which the harrow is apt to be choked, especially where the earth is bound with roots, which is commonly the case. At the same time, the lightness and number of teeth keep the harrow upon the surface, and prevent one of its capital purposes, that of dividing the soil. Nor will fewer teeth answer for covering the seed properly. In the third place, the teeth are too thin for reducing a coarse soil to proper tith; and yet it would be in vain to make them longer, because the harrow is too light for going deep into the ground. Further, the common harrows are ill contrived, as to ride at every turn one upon another. Much time is lost in disengaging them. Lastly, it is equally unfit for extirpating weeds. The ground is frequently left bound with couch-grafs, as to make the furrow-side stand upright, as when old lea is ploughed: notwithstanding much labour, the grafs-roots keep the field, and gain the victory.

A little reflection, even without experience, will make it evident, that the same harrows, whatever be

different forms, adapted for different purposes. They are all of the same weight, drawn each by two horses. Birch is the best wood for them, because it is cheap, and not apt to split. The first is composed of four bulls, each four feet ten inches long, three and a quarter inches broad, and three and a half deep; the interval between the bulls is one inch and three-fourths inches; so that the breadth of the whole harrow is four feet. The bulls are connected by four heaths which go through each bull, and are fixed by timber-nails driven through both. In each bull five teeth are inserted, ten inches free under the bull, and ten inches afunder. They are of the same form with those of the brake, and inserted into the wood in the same manner. Each of these teeth is three pounds weight; and where the harrow is made of birch, the weight of the whole is six stone 14 pounds. Dutch. An erect bridle is fixed at a corner of the harrow, three inches high, with four notches for drawing higher or lower. To this bridle a double tree is fixed for two horses drawing abreast, as in a plough. And to strengthen the harrow, a flat rod of iron is nailed upon the harrow from corner to corner in the line of the draught.

Fig. 4.

The second harrow consists of two parts, connected together by a crank or hinge in the middle, and two chains of equal length, one at each end, which keep the two parts always parallel, and at the same distance from each other. The crank is so contrived, as to allow the two parts to ply to the ground like two unconnected harrows; but neither of them to rise above the other, more than if they were a single harrow without a joint. In a word, they may form an angle downward, but not upward. Thus they have the effect of two harrows in curved ground, and of one weighty harrow in a plain. This harrow is composed of six bulls, each four feet long, three inches broad, and three and a half deep. The interval between the bulls is nine and a half inches; which makes the breadth of the whole harrow, including the length of the crank, to be five feet five inches. Each bull has five teeth, nine inches free under the wood, and ten inches afunder. The weight of each tooth is two pounds; the refit as in the former.

Fig. 5.

The third consists also of two parts, connected together like that last mentioned. It has eight bulls, each four feet long, two and a half inches broad, and three deep. The interval between the bulls is eight inches, and the breadth of the whole harrow including the length of the crank, is five feet four inches. In each bull are inserted five teeth, seven inches free under the wood, and ten and a half inches afunder, each tooth weighing one pound. The refit as in the two former harrows.

These harrows are a considerable improvement. They ply to curved ground like two unconnected harrows; and when drawn in one plain, they are in effect one harrow of double weight, which makes the teeth pierce deep into the ground. The imperfection of common harrows, mentioned above, will suggest the advantages of the set of harrows here recommended. The first is proper for harrowing land that has long lain after ploughing, as where oats are sown on a winter-furrow, and in general for harrowing stiff land: it pierces deep into the soil by its long teeth, and divides it minutely. The second is intended for covering the seed: its long teeth lay the seed deeper than the common harrow can do, which is no slight advantage. By placing the seed considerably under the surface, the young plants are, on the one hand, protected from too much heat, and, on the other, have sufficiency of moisture. At the same time, the seed is so well covered that none of it is lost. Seed slightly covered by the common harrows wants moisture, and is burnt up by the sun; besides, that a proportion of it is left upon the surface uncovered. The third harrow supplies what may be deficient in the second, by smoothing the surface, and covering the seed more accurately. The three harrows make the ground finer and finer, as hecules do liat; or, to use a different comparison, the first harrow makes the bed, the second lays the seed in it, the third, smooths the cloths. They have another advantage not inferior to any mentioned: they mix manure with the soil more intimately than can be done by common harrows; and upon such intimate mixture depends greatly the effect of manure as has already been explained. To conclude, these harrows are contrived to answer an established principle in agriculture. That fertility depends greatly on pulverizing the soil, and on an intimate mixture of manure with it, whether dung, lime, marl, or any other.

The Chain and Screw Harrow. Fig. 8. is the plan of a harrow also invented by Mr Sandilands, and to which he has given the name of the chain and screw harrow. Its properties are, that if your ridges be high, and you wish to harrow them from one end to the other, by lengthening the chain (which the screw commands), the harrow, when drawn along, forms an angle downwards, and mills none of the curve of the ridge, so far as it extends (which may be nine feet, the distance from A to B. The extent, in the contrary direction is five feet six inches). When the crowns of the ridges have got what is thought sufficient harrowing lengthwise, you shorten the chain by the screw, which forms an angle upwards: the harrow is then drawn by the horses, one on each side of the furrow; which completely harrows it, and the sides of the ridge, if 18 feet broad.

When you want to harrow even ground or high ridges across with the screw, you can bring the harrow to be horizontal, so as to work as a solid harrow without a joint.

The teeth are formed and fixed in the common manner, square, not in the fashion of coalters; and are nine or ten inches below the wood, and of such strength as it is thought the land requires. The teeth cut, or rather tear, the ground at every four inches without variation, though seemingly placed irregularly; and this without any risk of choking, except sometimes at the extreme angles, where the teeth are necessarily near each other; but which may be cleaned with the greatest ease, by raising them a little out of the ground. The figures 1, 2, &c. point out where the 12 teeth on each side of the harrow are placed.

Where a strong brake-harrow is not necessary, by making the teeth shorter and lighter, you may have 48 teeth, which will tear the ground at every two inches, cover the seed well, and make a fine mould.

It is recommended, that harrows for every purpose, and
The roller is an instrument of capital use in husbandry, though scarcely known in ordinary practice; and, where introduced, it is commonly fo flignt to as to have very little effect.

Rollers are of different kinds; stone, cast-iron, wood. Each of these has its advantages. We would recommend the last, constructed in the following manner. Take the body of a tree, six feet ten inches long, the larger the better, made as near a perfect cylinder as possible. Surround this cylinder with three rows of fillies, one row in the middle, and one at each end. Line these fillies with planks of wood equally long with the roller, and so narrow as to ply into a circle. Bind them fast together with iron-rings. Beech-wood is the belt, being hard and tough. The roller thus mounted, ought to have a diameter of three feet ten inches. It has a double pair of shafts for two horses at each end. These are sufficient in level ground; in ground not level, four horses may be necessary. The roller without the shafts ought to weigh 200 stone Dutch; and the larger diameter makes this great weight easy to be drawn.

Rolling wheat in the month of April is an important article in loofe foil; as the winter-rains preffing down the foil leave many roots in the air. Barley ought to be rolled immediately after the feed is fown, especially where grain-feeding is fown with it. The belt time for rolling a gravelly foil, is as soon as the mould is fof dry as to bear the roller without clinging to it. A clay foil ought neither to be tilted, harrowed, nor rolled, till the field be perfectly dry. And as rolling a clay foil is chiefly intended for smoothing the surface, a dry feafon may be patienfly waited for, even till the crop be three inches high. There is the greater reason for this precaution, because much rain immediately after rolling is apt to cake the surface when drought follows. Oats in a light foil may be rolled immediately after the feed is fown, unlefs the ground be fo wet as to cling to the roller. In a clay foil, delay rolling till the grain be above ground. The proper time for fowing grain-feeding in an oat-field, is when the grain is three inches high; and rolling should immediately succeed, whatever the foil be. Flax ought to be rolled immediately after fowing. This should never be neglected; for it makes the feed pull equally, and prevents after growth; the bad effect of which is visible in every step of the process for fowing flax. The first year’s crop of fown graffes ought to be rolled as early the next iping as the ground will bear the horses. It fixes all the roots precisely as in the case of wheat. Rolling the second and third crops in loofe foil is an useful work; though not fo essential as rolling the firft crop.

In the firft place, rolling renders a loofe foil more compact and folid; which encourages the growth of plants, by making the earth clap close to every part of every root. Nor need we be afraid of rendering the foil too compact; for no roller that can be drawn by two or four horses will have that effect. In the next place, rolling keeps in the moifure, andbinds drought to penetrate. This effect is of great moment. In a dry feafon, it may make the difference of a good crop, or no crop, especially where the foil is light. In the third place, the rolling grain-feeding, besides the foregoing advantages, facilitates the moving for hay; and it is to be hoped, that the advantage of this practice will lead farmers to mow their corn alfó, which will increase the quantity of straw both for food and for the dunghill.

There is a small roller for breaking clods in land intended for barley. The common way is, to break clods with a mall, which requires many hands, and is a laborious work. This roller performs the work more effectually, and at much lefs expense; let a harrowing precede, which will break the clods a little; and after lying a day, or a day and a half, to dry, this roller will dissolve them into powder. This however does not preclude the use of the great roller after all the other articles are finifhed, in order to make the foil compact, and to keep out the summer-drought. A stone roller four feet long, and fifteen inches diameter, drawn by one horfe, is sufficient to break clods that are easily difolved by preflure. The use of this roller in preparing land for barley is gaining ground daily, even among ordinary tenants, who have become fenfible both of the expence and toil of using wooden malls. But in a clay foil, the clods are fometimes too firm, or too tough, to be fubdued by fo light a machine. In that cafe, a roller of the fame size, but of a different conftuction, is necefly. It ought to be furred round with circles of iron, fix inches alunder, and seven inches deep; which will cut even the moft hard born clods, and reduce them to powder. Let not this instrument be considered as a finical refinement. In a fiff clay, it may make the difference of a plentiful or fcarcy crop.

6. The FALLOW-CLEANING MACHINE.

This was invented by Mr Aaron Ogden, a fmith at Alton-under-Lyne, near Manchester in Lancashire. It is intended for cleaning fallows from weeds, &c. by the machine which exhaust the riches of the foil. A, A, is the frame; B, the firft roller; C, the second ditto; in which laft are two cranks to move the arms D, D, which work the rake up the directors fixed on the plank E. The underfide of the lower ends of these directors are harrow to cut the clods and let them come on the upper side. Each alternate heel of the share is longer than the intermediate one, that they may not have more than one-half to cut at once. At the back of the plank E are two fcrews to let it loofe, that the directors may be let higher or lower. The shares are to penetrate the ground two or three inches, to raife the quicks till the rake I, I, raifes them into the cart H, where a man must be ready with a muck-hook to clear them backward when gathered. In the rake I are two teeth for every space of the directors, that foanes, &c. may be gathered without damage. K, K, are two fnapes, by which the machine is drawn: under them are two hooks placed low to raife the machine in turning, by the help of the shares; and the axle-tree of the cart should be fixed upon a pin, that it may turn like a waggion. F, F, are the triggers to throw the rake behind the roots. The long teeth at G, G, are to clean the roller C, I, I, is the rake which gathers up the weeds into
Part II. AGRICULTURE.

Practice.

into the cart H, and is drawn above the trigger F by the working of the arms D, D, expressed by the dotted lines at d d. The triggers e, of which there is one on each side, move on the pivots a, so that when the points b of the rake, have been drawn up by the directors E to the part marked c, the trigger, giving way p, permits the rake to pass; but immediately falling, the rake returns along the upper surface of the trigger marked e, e, and of course falls on the weeds when it comes to the end, a little beyond the pivot a. The reader will observe, that the boarding is taken away on one side, in the Plate, in order to give a more perfect view of the inner part of the machine; and in fact it would perhaps be better if all the boarding, marked L, L, was taken away, and frame-work put in its stead. The cart H might undoubtedly also be made lighter. The wheels M, M, appear described by the end of the roller N, to be divided by four fruit lines into eight equal segments, as represented at P. Let the fame be done at the other end of the roller, and parallel lines be drawn from one corresponding point to the other the length of the roller; mark the points with figures 1, 2, 3, 4, 5, 6, 7, 8; afterwards draw oblique lines, as from 1, at the end of O to 2, at the other end, and from 2 to 3, &c. on these oblique lines the spikes are to be fixed at equal distance in eight circles, described on the circumference of the roller. The spikes of the small roller B are fixed in the same manner, except that the diameter being smaller, there are only six instead of eight rows. R is another view of the directors, with the plank E on which they are fixed; and S is a section of a part of the plank, with one of the directors as fixed, in which may be seen the heel m, from whence to the point of the share n is a sharp cutting edge. See the same letters in figure R. T is one of the long teeth to be seen at G; it is bent towards the roller C, which it serves to cleanse. When the end of the rake b, after riling above c, is pulled, by the motion of the arms D, D, along the upper part e, of the trigger F, and comes to the end beyond a; as it falls, the part of the arm marked e reffs in the notch p, till it is again raised by the motion of the roller C with the rake. The roller C is to be one foot diameter, the spikes nine inches long, that they may go through the furrow (if the soil should be loose) into the hard earth, the more effectually to work the rake, which otherwise might be so overcharged as to caufe the roller to drag without turning. In the rake-ends b their should be pivots, with rollers or pullers on, to go in the groove, to take off the friction; and they would likewise take the triggers more fully as the rake comes back. The rake should also be hung so far backward, that when it is fallen the arms of it may lie in the same plane or parallel with the directors, on which it comes up (which will require the frame to be two inches longer in the model). This will cause the rake to fall heavier, and drive the teeth into the roots, and bring them up without flattering. These teeth must be made of steel, very fine, and so long as to reach down to the plank on which the directions are fixed, that is to say, six inches long (the directors are also to be made six inches broad above the plank). The rake-head should also fall a little before the crank is at its extremity, which will cause the rake to push forward to let the teeth come into the roots. The rake-teeth must drop in the same plane with the roller and wheels, or on the surface of the earth. No more space should be given from the roller C to the long teeth at G G than that the rake may just miss the spikes of the roller C and fall on the places before mentioned. As the first roller B was intended to cleanse the second C more than for any other use, it may be omitted when the machine is made in large, as Mr. Ogden has lately found that the long teeth at G G answer the end alone, and this renders the machine about a sixth part shorter. Now, to fit any fort of earth, there should be to each machine three planks, with directors at different spaces, to act occasionally; in the first, the spaces between the directors should be eight inches wide, in the second six, and the third four. This will answer the same end as having to many machines.

As there may be some objections to the rake not leaving the roots when it has brought them up, Mr. Ogden has several methods of cleansing it; but as he would make it as simple as possible, he chooses to let it be without them at present; but suppose it should bring some roots back again with it, it will probably lose them before it gets back to the extremity; whence they will lie light, and be of but little detriment to the others coming up. Mr. Ogden would have the first machine made four feet six inches wide, the teeth divided into equal spaces the outsides into half spaces.


This machine, whether made to be worked by hand, drawn by a horse, or fixed to a plough, and used with it, is extremely simple in the construction, and not machine, liable to be put out of order; as there is but one movement to direct the whole, nor does it require any skill in working. It will sow wheat, barley, oats, rye, clover, cole-seed, hemp, flax, Canary, rape, turnip, besides a great variety of other kinds of grain and seeds broad cast, with an accuracy hitherto unknown. It is equally useful in the new husbandry, particularly when fixed to a plough; it will then drill a more extensive variety of grain, pulse, and seed (through every gradation, with regard to quantity), and deliver each kind with greater regularity than any drill-plough whatever. When used in this manner, it will likewise be found of the utmost service to farmers who are partial to the old husbandry, as, among many other very valuable and peculiar properties, it will not only sow in the broad-cast way with a most singular exactness, but save the expense of a seedman; the seed being sown (either over or under furrow at pleasure), and the land ploughed, at the same operation.

Perhaps a fair and decisive experiment for ascertaining the superior advantages of broad-casting or drilling any particular crop was never before practicable; as the seed may now be put in with the utmost degree of regularity, in both methods of culture, by the same machine;
Agriculture

Practice.

Machine; consequently, the feed will be fown in both
cases with equal accuracy, without which it is impos-
tible to make a just decision.

The excellence of this machine consists in spreading
any given quantity of feed over any given number of
acres, with a mathematical exactness, which cannot be
done by hand; by which a great saving may be made
in feeding the ground, as well as benefiting the ex-
cyeted crop.

There has always been a difficulty in sowing turnip
seed with any degree of exactness, both from the mi-
nuteneat of the feed, and the smallness of the quantity
required to be fown on an acre. Here the machine
has a manifest advantage, as it may be set to fow the
least quantity ever required on an acre; and with an
accuracy the best feedman can never attain to.

It will also fow clover, cole, flax, and every other
kind of small feed, with the utmost degree of regularity.

It will likewise broad-cast beans, peas, and tares, or
drill them with the greatest exactness, particularly
when constructed to be used with a plough.

Another advantage attending the use of this ma-
chine, is that the wind can have no effect on the fall-
ing of the feed.

Of the Machine when made to be used without a
Plough, and to be drawn by a Horse.—It may in
this cafe be made of different lengths at the desire of
the purchaser. The upper part AAAAA, contains
the hoppers from which the grain or feed descends into
the spouts. The several spouts all rest upon a bar,
which hangs and plays freely by two diagonal
supporters BB; a trigger fixed to this bar bears a catch wheel; this being fixed on the axle, occasions a regular and
continual motion, or jogging of the spouts, quicker or
slower in proportion to the pace the person fowing
with it drives; and of course, if he quickens his pace,
the bar will receive a greater number of strokes from
the catch wheel, and the grain or feed will feed the
faster. If he drives slower, by receiving fewer strokes,
the contrary must take place. In going along the
side of a hill, the strength of the stroke is corrected by
a spring which acts with more or less power, in pro-
portion as the machine is more or less from a hori-
zontal position, and counteracts the difference of gravity in
the bar, so that it presses, in all situations, with a pro-
per force against the catch wheel. This spring is un-
necessary if the land be pretty level. At the bottom
of the machine is placed an apron or shelf in a sloping
position, and the corn or feed, by falling thereon from
the spouts above, is scattered about in every direction
under the machine, and covers the ground in a most
regular and uniform manner.

To fow the corn or bean drills, there are moveable
spouts (see fig. 10.) which are fixed on, or taken off
at pleasure, to direct the feed from the upper spout to
the bottom of the furrow.

The machine is regulated for fowing any particular
quantity of feed on an acre by a brass slider, A, fig. 7,
fixed by screws against a brass bridge on each of the
spouts. The machine is prevented from feeding while
turning at the ends, by only removing the lever, E,
fig. 2, out of the channel G, to another at H, on the
right hand of it, which carries back the bar from the
catch-wheel, and occasions the motion of the spouts to
cease, and at the same time brings them upon a level
by the action of the diagonal supports; so that no
corn or feed can fall from them.

The machine in this form is particularly useful for
broads-casting clover upon barley or wheat; or for fow-
ing any other kind of feed, where it is necessary that
the land should first be harrowed exceedingly fine and
even.

Manner of using the Machine when drawn by a
Horse.—Place the machine about two feet from the
ends of the furrows where you intend it shall begin to
fow. Fill the hoppers with feed, and drive it forward
with the outside wheel in the first furrow. When you
are at the end of the length, at the opposite side of the
field, lift the lever E, fig. 2, into the channel H, and
the machine will instantly stop fowing. Drive it on
about two feet and then turn. Fill the hoppers again
if necessary; then remove the lever back again into the
channel G, and in returning, let the outside wheel of
the machine go one furrow within the track which
was made by it, in falling from the opposite end: as
for example, if the wheel passed down the eighth fur-
row from the outside of the field, let it return in the
seventh; and in every following length let the outside
wheel always run one furrow within the track made
by the same wheel: because the breadth sown is about
nine inches less than the distance between the wheels.

Let the machine be kept in a perpendicular situa-
tion. If the farmer wishes to sow more or less feed
on any one part of the field than the other, it is only
raising the handles a little higher, or finking them a
litle lower than usual, and it will occasion a sufficient
alteration; and should the land turn be left in breadth
than the machine, those spouts which are not wanted
may be taken up from the bar, and prevented from
feeding, by turning the knob above them.

Also when the land required to be fown has what is
called a vent, that is, when the sides of the field run in
an oblique line to the furrows, which by this means
are unequal in length: the spouts must be taken up or
let down in succession by turning the knobs; as that
part of the machine, where they are placed, arrives at
the ends of the furrows. This is done while the ma-
chine is going forwards.

If the land be tolerably level, the machine may be
fixed by the screw in the front, and the machine may
then be used by any common harrow boy.

Method of regulating the Machine.—In each spout
is fixed a bridge, (see fig. 7.) with an aperture in it, B,
for the grain or feed to pass through. This aperture
is enlarged or contracted by a slider, A, which passes
over it; and when properly fixed for the quantity of feed
designed to be sown on an acre, is fastened by means
of two strong screws firmly against the bridge. This
is made use of in fowing all kinds of feed, where it is
required to fow from one belt upwards on an acre.

To fow one, two, three gallons, or any of the inter-
mediate quantities, as of clover, cole-feed, &c. the
brass plate, fig. 6. is placed between the bridge and the
slider, with the largest aperture B downwards, which
aperture is enlarged or contracted by the slider as be-
fore. To fow turnips, the same plate is placed be-
tween the bridge and the slider, with its smallest ap-
erture A downwards, and the hollow part about the same
aperture inwards.

Fig. 1. is a view of the regulator, by which the
aperture
Part II. AGRICULTURE.

The apertures in the several spouts are all set exactly alike, with the utmost care, to make them feed equally. The extreme height of the largest aperture is equal to the breadth A B, and the breadth at C is equal to the height of the smallest aperture used, viz. that for turnips. The side AC, is divided into 60 equal parts, and on it move the slider or horse D; which being placed at any particular degree, according to the quantity of feed required to be sown on an acre, is fixed upon it, by a screw on the side of the slider or horse.

When this is done, the end of the regulator is put through the aperture in the bridge or plate (whichever is intended to be used), and the slider against the bridge in the spout, raised by it, till it stops against the horse on the regulator; then the slider is fastened against the bridge firmly by the two screws; care being taken at the same time that it stands nearly square.

By this means the spouts (being all fixed in the same manner) will feed equally. It is easy to conceive that the size of the apertures, and consequently the quantity of feed to be sown on an acre, may be regulated with a far greater accuracy than is required in common practice.

The spouts may be regulated with the utmost nicety, in five minutes, to sow each particular feed, for the whole season. But a little practice will enable any person, who possesses but a very moderate capacity, to make the spouts feed equally, even without using the regulator (A).

Of the Machine when made to be used by Hand.—The difference of the machine in this case, is that it is made lighter, with but three spouts, without shafts, and is driven forward by the handles. It hath also a bolt in front, which being pushed in by the thumb, releases the machine; so that it can then easily be placed in a perpendicular position. This alteration is necessary to keep the handles of a convenient height, in sowing up and down a hill, where the slope is considerable; and is done while the machine is turning at the end of the length. The method of regulating and using it is the same as when made to be drawn by a horse.

Of the Machine, when constructed to be used with a Plough.—This is, without doubt the most useful application of the machine, and it can be fixed without difficulty to any kind of plough, in the same manner as to that represented fig. 7.

The advantages arising from the use of it are great and numerous; for, besides the increase in the crop, which will be injured by the seeds being broad-cast with a mathematical nicety, a large proportion of feed (the value of which alone, in a few months, will amount to more than the price of the machine) and the feedman’s labour will be saved. The feed may likewise be sown either under or over furrow; or one cast each way, as practised by some farmers. The feed also, being cast by the machine upon the fresh ploughed land, may be immediately harrowed in, before the mould has loft any part of its moisture; which in a dry season will greatly promote the crop. In drilling any kind of grain, pulse, or feed, it polishes every property that can be wished for in the belt drill-plough, nor will it (as most of them do) bruise the feed, or feed irregularly. The contrivance of the machine is the same as the large ones, except being made with one hopper and spout instead of several, and the apron moveable instead of being fixed, as may be seen by inspecting fig. 4. The only alteration necessary to make the machine broad-cast or drill is, in the former case to place the apron B, fig. 1. at the bottom of the machine, upon the hooks FP, hoping either towards the furrows or the imploughed land, according as it is intended to sow the feed, either under or over furrow. Whenever the apron is required to be shifted, it is done in less than a second of time; as it only requires to be moved up or down with the hand, when a catch fixes it.

To prepare it for drilling, instead of the apron, place the long spout, fig. 10, upon the brackets, on the front of the machine, by the ears AA, to receive the feed from the upper spout, and to the lower end of it, by a small cord, to that hook upon which the apron is hung for broad-casting, which is next the plough (see fig. 3.) the feed will then be directed by the long spout, to the centre of the furrow, near the heel of the plough. The spring for correcting the strength of the broke, is necessary only when they are required to go along the side of a considerable declivity. The machine, when fixed to a plough, does not require the smallest degree of skill in using, as nothing is necessary but to keep the hopper filled, which will contain a sufficient quantity of feed to go upwards of 140 rods, before it will want re-filling, when three bushels and a half are sown on an acre. The accuracy with which it will broad-cast, may in some measure be conceived, by considering that the feed regularly descends upon the apron or shelf, and is from thence scattered upon the ground, in quantity exactly proportioned to the speed of the plough; also that each cast spreads to the third furrow; and by this means flushes upon the last. In this manner it is continually filling up till the whole field is completely covered; so that it is impossible to leave the smallest space without its proper quantity of feed.

When the plough is wanted for any other purpose.

(a) Proper directions are given with each machine for using it, as also for fixing the sliders to sow any particular quantity of corn or feed on an acre, so as to enable any person to set the spouts.

The prices of the machine (exclusive of the packing cases) are as follow. If constructed to be used with a single furrow plough; the wheel, with the axle and checks included, $8.00, regulator, brass-plates for broad-casting or drilling turnips, lucerne, tares, wheat, barley, &c. &c. &c. and every article necessary for fixing it included, three guineas and a half. If made with a spring (for sowing on the side of a hill, where the slope is considerable), but which is very rarely necessary, five shillings more. If made to be fixed to any double-furrow plough, four guineas and a half.

The large machine, fig. 2, when made to broad-cast seven furrows at a time, and to be drawn by a horse, eight guineas and a half. If constructed to sow five furrows at a time, and to be used by hand, six guineas. These are also five shillings more if made with a spring.
the machine, with the wheel at the heel of the plough for giving it motion, can be removed or replaced at any time in five minutes.

Fig. 11 represents the machine fixed to a double furrow cresting plough, and prepared for drilling. As this plough may not be generally known, it will not be improper to observe, that it is chiefly used for creating the land with furrows (after it has been once ploughed and harrowed); which method is necessary when the feed is to be sown broad-cast upon land that has been a clover- lay, &c., because, if the feed be thrown upon the rough furrows, a considerable part of it will fall between them, and be unavoidably lost, by laying to deep buried in the earth. This mode answers extremely well, and partakes of both methods of culture; the double-furrow plough, is made with two upper aprons for broad-casting, two aprons for double-furrow ploughing, two long spouts for drilling, two aprons for broad-casting, and with a double hopper; but in other respects the same as when intended for a single furrow plough: it is used in all cases with the greatest ease imaginable.

The interval between the points of the two shares of a creasing plough is usually ten inches; the beam about nine feet long; and the whole made of a light construction.

An more particular explanation of the figures.—Fig. 1. The machine fixed to a Kentish turn-wrest plough. A, The machine. B, the apron upon which the feed falls and rebounds upon the land, in broad-casting. C, Lid to cover the hopper. D, Wheel at the heel of the plough. E, Strap. FF, Hooks upon which the apron turns by a pivot on each side. G, Stays, to keep the machine steady. H, Lever to prevent it from sowing.

Fig. 2. The machine constricted to be drawn by a horse. AAA, The hoppers. BB, The diagonal supports. CCC, The upper spouts. D, The apron or shelf upon which the feed falls from the upper spouts. E, The lever, which carries back the bar, and prevents the machine from sowing. FF, Staples upon the handles, through which the reins pass, for the man who conducts the machine, to direct the horse by. I, Screw to fix the machine occasionally. N, B. The knobs (by turning which each particular spout may be taken from off the bar, and thereby prevented from feeding) are over each upper spout; but, to prevent confusion, are not lettered in the Plate.

Fig. 3. Is the same machine with that in fig. 1. The dotted lines, expressing the situation of the long spout, when the apron is removed, and the machine adapted for drilling.

Fig. 4. Also the same machine, with the front laid open to show the inside. A, The catch-wheel fixed upon the axle. BB, The axle upon which the machine hangs between the handles of the plough. C, The pulley, by which the strap from the wheel at the heel of the plough turns the catch-wheel. D, The bar, upon which the upper spout rests, suspended by the diagonal supporters EE, bearing against the catch-wheel by the trigger F, and thereby kept in motion while the plough is going. G, the apron in a flopping position, upon which the corn or feed falls from the upper spout, and is scattered by rebounding upon the land. It turns upon pivots, and by this means throws the feed either towards the right hand or left at pleasure.

Fig. 5. The upper spout.

Fig. 6. The plate which is placed between the bridge and the flider for sowing small seeds. The aperture A being downwards for sowing turnips; the larger one B downwards for sowing clover, &c.

Fig. 7. The bridge, fixed in the upper spouts. A, The flider, which contracts or enlarges the different apertures. B, the aperture in the bridge, through which the feed passes, when sowing any quantity from one bushel upwards on an acre.

Fig. 8. The regulator made of brass. D, The flider or horse which moves upon it, and is fixed at any particular degree by a screw in its side.

Fig. 9. Represents the movement in the machine fig. 1. AAAA. Cleets, between which the upper spouts rest. BB, The diagonal supports by which the bar with the upper spouts hang. C, The catch-wheel. DD, the axle. E, The trigger upon the bar, which bears against the catch-wheel. FF, Stays from the back of the machine, by which the bar plays.

Fig. 10. The long spout. AA, The ears by which it hangs.

SECT. II. Preparing Land for Cropping.

I. OBSTRUCTIONS TO CROPPING.

In preparing land for cropping, the first thing that obstructs occurs, is to consider the obstructions to regular ploughing. The most formidable of these,are stones lying above or below the surface, which are an impediment to a plough, as rocks are to a ship. Stones above the surface may be avoided by the ploughman, though not without loss of ground; but stones below the surface are commonly not discovered till the plough be hattered to pieces, and perhaps a day’s work lost. The clearing land of stones is therefore necessary to prevent mischief. And to encourage the operation, it is attended with much actual profit. In the first place, the stones are useful for fences; when large they must be blown, and commonly fall into parts proper for building. And as the blowing, when gunpowder is furnished, does not exceed a halfpenny for each inch that is bored, these stones come generally cheaper than to dig as many out of the quarry. In the next place, as the soil round a large stone is commonly the best in the field, it is purchased at a low rate by taking out the stone. Nor is this a trifle; for not only is the ground loft that is occupied by a large stone, but also a considerable space round it, to which the plough has not access without danger. A third advantage is greater than all the rest; which is, that the ploughing can be carried on with much expedition, when there is no apprehension of stones: in stony land, the plough must proceed so slow as not to perform half of its work.

To clear land of stones, is in many instances an undertaking
Part II.

AGRICULTURE.

A clay soil of any thickness is never peopled with springs; but it is peopled with water, which settles on the surface as in a cup. The only remedy is high narrow ridges, well rounded. And to clear the furrows, the furrow of the foot-ridge ought to be considerably lower, in order to carry off the water cleverly. It cannot be made too low, as nothing hurts clay soil more than the stagnation of water on it; witness the hollows at the end of crooked ridges, which are absolutely barren. Some gravelly soils have a clay bottom, which is a substantial benefit to a field when in grays, as it retains moisture. But when in tillage, ridges are necessary to prevent rain from settling at the bottom; and this is the only case where a gravelly soil ought to beridged.

Clay soils that have little or no level, have sometimes a gravelly bottom. For discharging the water, the best method is, at the end of every ridge to pierce down to the gravel, which will absorb the water. But if the furrow of the foot-ridge be low enough to receive all the water, it will be more expedient to make a few holes in that furrow. In some cases, a field may be drained, by filling up the hollows with earth taken from higher ground. But as this method is expensive, it will only be taken where no other method answers. Where a field happens to be partly wet, partly dry, there ought to be a separation by a middle ridge, if it can be done conveniently; and the dry part may be ploughed while the other is drying.

The low part of Berwickshire is generally a brick clay, extremely wet and poachy during winter. This in a good measure may be prevented by proper inclosing, as there is not a field but can be drained into lower ground all the way down to the river Tweed. But as this would lessen the quantity of rain in a dry climate, such as is all the east side of Britain, it may admit of some doubt whether the remedy would not be as bad as the disease. (See the article Draining.)

2. Bringing into culture, land from the state of nature.

To improve a moor, let it be opened in winter when it is wet, which has one convenience, that the plough cannot be employed at any other work. In spring, after frost is over, a light harrowing will fill up the teams with mould, to keep out the air, and rot the sod. In that state let it lie the following summer and winter, which will rot the sod more than if laid open to the air by ploughing. Next April, let it be cross-ploughed, braked, and harrowed, till it be sufficiently pulverised. Let the manure laid upon it, whether lime or dung, be intimately mixed with the soil by repeated harrowings. This will make a fine bed for turnip-feed if town bread-cast. But if drills be intended, the method must be

(a) By this expression it is not meant that the ground really becomes acid, but only that it becomes unfit for the purposes of vegetation. The natural products of such a soil are rushes and four grasses which last appears in the furrows, but seldom in the crown of the ridge; is dry and insubstantial like a chip of wood; and feels rough when trod backwards.
be followed that is directed afterward in treating more directly the culture of turnip.

A successful turnip-crop, sown on the ground with fleece, is a fine preparation for laying down a field with grass-seeds. It is an improvement upon this method, to take one or two successive crops of turnip, which will require to be followed by the second and following crops. This will thin the soil, and enrich it greatly.

The best way of improving swampy ground after draining, is paring and burning. But where the ground is dry, and the soil so thin that the surface cannot be pared, the best way of bringing it into tillth from the state of nature, as mentioned above, is to plough it with a feathered foot, laying the grassy surface under. After the new surface is mellowed with frost, fill up all the seams by harrowing crofs the field, which by excluding the air will effectually rot the sod. In this state let it lie frosty and winter. In the beginning of May after, a cross ploughing will reduce all to small fragments, which must be nearly crooked with the brake, and make it ready for a May or June crop. If these square pieces be allowed to lie long in the sap without breaking, they will become tough and not be easily reduced.

3. Forming RIDGES.

The first thing that occurs on this head, is to consider what grounds ought to be formed into ridges, and what ought to be tilled with a flat surface. Dry soils, which suffer by a lack of moisture, ought to be tilled flat, which tends to retain moisture. And the method for such tilling, is to go round and round from the circumference to the centre, or from the centre to the circumference. This method is advantageous in point of expedition, as the whole is finished without once turning the plough. At the same time, every inch of the soil is moved, instead of leaving either the crown or the furrow unmoved, as is commonly done in tilling ridges. Clay soil, which suffers by water standing on it, ought to be laid as dry as possible by proper ridges. A loamy soil is the middle between the two mentioned. It ought to be tilled flat in a dry country, especially if it inclines the soil first mentioned. In a moist country, it ought to be formed into ridges, high or low according to the degree of moisture and tendency to clay.

In grounds that require ridging, an error prevails, that ridges cannot be raised too high. High ridges labour under several disadvantages. The soil is heaped upon the crown, leaving the furrows bare: the crown is too dry, and the furrows too wet: the crop, which is always best on the crown, is more readily shaken with the wind, than where the whole crop is of an equal height: the half of the ridge is always covered from the sun, a disadvantage which is far from being sight in a cold climate. High ridges labour under another disadvantage in ground that has no more level than barely sufficient to carry off water: they sink the furrows below the level of the ground; and consequently retain water at the end of every ridge. The furrows ought never to be sunk below the level of the ground. Water will more effectually be carried off by leveling the ridges both in height and breadth; a narrow ridge, the crown of which is but 18 inches higher than the furrow, has a greater slope than a very broad ridge where the difference is three or four feet.

Next, of forming ridges where the ground hangs considerably. Ridges may be too steep as well as too horizontal; and if to the ridges be given all the steepness of a field, a heavy shower may do irreparable mischief. To prevent such mischief, the ridges ought to be fo directed crofs the field, as to have a gentle slope for carrying off water slowly, and no more. In that respect, a hanging field has greatly the advantage of one that is nearly horizontal; because in the latter, there is no opportunity of a choice in forming the ridges. A hill is of all the best adapted for directing the ridges properly. If the soil be gravelly, it may be ploughed round and round, beginning at the bottom and ascending gradually to the top in a spiral line. This method of ploughing a hill, requires no more force than ploughing on a level; and at the same time it overcomes the great inconvenience of a gravelly hill, that rains go off too quickly; for the rain is retained in every furrow. If the soil be such as to require ridges, they may be directed to any slope that is proper.

In order to form a field into ridges, that has not been formerly cultivated, the rules mentioned are easily put in execution. But what if ridges be already formed, that are either crooked or too high? After seeing the advantage of forming a field into ridges, people were naturally led into an error, that the higher the better. But what could tempt them to make their ridges crooked? Certainly this method did not originate from design: but from the laziness of the driver suffering the cattle to turn too hastily, instead of making them finish the ridge without turning. There is more than one disadvantage in this slovenly practice. First, the water is kept in by the curve at the end of every ridge, and flows the ground. Next, as a plough has the least friction possible in a straight line, the friction must be increased in a curve, the back part of the mouldboard pressing hard on the one hand, and the coulter pressing hard on the other. In the third place, the plough moving in a straight line, has the greatest command in laying the earth over. But when the straight line of the plough is applied to the curve of a ridge in order to heighten it by gathering, the earth moved by the plough is continually falling back, in spite of the most skilful ploughman.

The inconveniences of ridges high and crooked are so many, that one would be tempted to apply a remedy at any risk. And yet, if the soil be clay, it would not be advisable for a tenant to apply the remedy upon a lease shorter than two nineteen years. In a dry gravelly soil, the work is not difficult nor hazardous. When the ridges are cleared two or three years successively in the course of cropping, the operation ought to be concluded in one summer. The earth, by reiterated ploughings, should be accumulated upon the furrows, so as to raise them higher than the crowns: they cannot be raised too high, for the accumulated earth will subside by its own weight. Crofs-ploughing once or twice, will reduce the ground to a flat surface, and give opportunity to form ridges at will. The same method brings down ridges in clay soil; only let care be taken to carry on the work with expedition; be-
Part II.

AGRICULTURE.

cause a hearty shower, before the new ridges are formed, would soak the ground in water, and make the farmer suspend his work for the remainder of that year at least. In a strong clay, we would not venture to alter the ridges, unless it can be done to perfection in one season. On this subject Mr. Anderson has the following observations.

"The difficulty of performing this operation properly with the common implements of husbandry, and the obvious benefit that accrues to the farmer from having his fields level, has produced many new inventions of ploughs, harrows, drags, &c. calculated for speedily reducing the fields to that state; none of which have as yet been found fully to answer the purpose for which they were intended, as they all indiscriminately carry the earth that was on the high places into those that were lower; which although it may, in some cases render the surface of the ground tolerably smooth and level, is usually attended with inconveniences far greater, for a considerable length of time, than that which it was intended to remove.

"For experience sufficiently shows, that even the best vegetable mould, if buried for any length of time far beneath the surface as to be deprived of the beneficial influences of the atmosphere, loses its virtue, if I may be allowed to express it; becomes an inert, lifeless mass, little fitted for nourishing vegetables, and constitutes a foil very improper for the purposes of the farmer. It therefore behoves him, as much as in him lies, to preserve, on every part of his field, an equal covering of that vegetable mould that has long been uppermost, and rendered fertile by the modifying influence of the atmosphere. But, if he suddenly levels his high ridges by any of these mechanical contrivances, he of necessity buries all the good mould that was on the top of the ridges in the old furrows; by which he greatly impoverished one part of his field, while he too much enriched another; insomuch that it is a matter of great difficulty, for many years thereafter, to get the field brought to an equal degree of fertility in different places; which makes it impossible for the farmer to get an equal crop over the whole of his field by any management whatever; and he has the mortification frequently, by this means, to see the one half of his crop rotted by an over-luxuriance, while other parts of it are weak and sickly, or one part ripe and ready for reaping, while the other is not properly filled; so that it were, on many occasions, better for him to have his whole field reduced at once to the same degree of poorness as the poorest of it, than have it in this state. An almost impracticable degree of attention in spreading the manures may indeed in some measure get the better of this; but it is so difficult to perform this properly, that I have frequently seen fields that had been thus levelled, in which, after thirty years of continued culture and repeated dressings, the marks of the old ridges could be distinctly traced when the corn was growing, although the surface was so level that no traces of them could be perceived when the corn was off the ground.

"But this is a degree of perfection in levelling that cannot be usually attained by following this mode of practice; and, therefore, is but seldom seen. For all that can be expected to be done by any levelling man-

chine, is to render the surface perfectly smooth and even in every part, at the time that the operation is performed; but, as in this case, the old hollows are suddenly filled up with loose mould to a great depth, while the earth below the surface upon the heights of the old ridges remains firm and compact, the new-raised earth after a short time subsides very much, while the other parts of the field do not sink at all; so that in a short time the old furrows come to be again below the level of the other parts of the field, and the water of course is suffered in some degree to stagnate upon them; so much that, in a few years, it becomes necessary once more to repeat the same levelling process, and thus renew the damage that the farmer sustains by this pernicious operation.

"On these accounts, if the farmer has not a long leaf, it will be found in general to be much his interest sometimes not to leave the ridges as he found them, rather than to attempt to alter their direction; and, if he attends with due caution to moderate the height of these old ridges, he may reap very good crops, although perhaps at a somewhat greater expense of labour than he would have been put to upon the same field, if it had been reduced to a proper level surface, and divided into straight and parallel ridges.

"But, whereas a man is secure of possessing his ground for any considerable length of time, the advantages that he will reap from having level and well-laid-out fields, are so considerable as to be worth purchasing, if it should even be at a considerable expense. But the lofs that is sustained at the beginning, by this mechanical mode of levelling ridges, if they are of considerable height, is so very great, that it is perhaps doubtful if any future advantages can ever fully compensate it. I would therefore advise, that all this levelling apparatus should be laid aside; and the following more efficacious practice be substituted in its stead: A practice that I have long followed with success, and can safely recommend as the very best that has yet come to my knowledge.

"If the ridges have been raised to a very great height, as a preparation for the ensuing operations, thou of them may be first eleven, or failed out, as it is called in levelling, different places; that is, ploughed so as to lay the earth on each ridge from the middle towards the furrows. But, if they are only of a moderate degree of height, this operation may be omitted. When you mean to proceed to level the ground, let a number of men be collected, with spades, more or fewer as the nature of the ground requires, and then let a plough to draw a furrow directly across the ridges of the whole field intended to be levelled. Divide this line into as many parts as you have labourers, allotting to each one ridge or two, or more or less, according to their number, height, and other circumstances. Let each of the labourers have orders, as soon as the plough has passed that part assigned him, to begin to dig in the bottom of the furrow that the plough has just made, about the middle of the side of the old ridge, keeping his face towards the old furrow, working backwards till he comes to the height of the ridge, and then turn towards the other furrow, and repeat the same on the other side of the ridge, always throwing the earth that he digs up into the deep old furrow between the ridges,
A C R I C U L T U R E.

Practice.

Let it be a rule, to direct the ridges north and south, if the ground will permit. In this direction the east and west sides of the ridges, dividing the furrows equally between them, will ripen at the same time.

It is a great advantage in agriculture, to form ridges as narrow as possible, so narrow, and so low, as to admit the crowns and furrows to be changed alternately every crop. The soil near each surface of the ridges, is the best; and by such ploughing, it is always kept near the surface, and never buried. In high ridges, the soil is accumulated at the crowns and furrows left bare. Such alterations of crown and furrow, is easy where the ridges are no more but seven or eight feet broad. This mode of ploughing answers perfectly well in sandy and gravelly soils, and even in loam; but it is not safe in clay soil. In that soil, the ridges ought to be 12 feet wide, and 20 inches high; to be preferred always in the same form by casting, that is, by ploughing two ridges together, beginning at the furrow that separates them, and ploughing round and round till the two ridges be finished. By this method, the separating furrow is raised a little higher than the furrows that bound the two ridges. But at the next ploughing, that inequality is corrected, by beginning at the bounding furrows, and going round and round till the ploughing of the two ridges be completed at the separating furrow.


For this purpose a new instrument, termed a cleaning harrow, has been introduced by Lord Kames, and is strongly recommended (1). It is one entire piece, like the first of those mentioned above, consisting of seven bulls, four feet long each, two and one-fourth inches broad, and three-fourths deep. The bulls are united together by thongs, similar to what are mentioned above. The intervals between the bulls being three and three-fourths inches, the breadth of the whole harrow is three feet five inches. In each bull are inserted eight teeth, each nine inches free below the wood, and distant from each other six inches. The weight of each tooth is a pound, or near it. The whole is firmly bound by an iron plate from corner to corner in the line of the draught. The reef as in the harrows mentioned above. The size, however, is not invariable. The cleaning harrow ought to be larger or less according as the soil is stiff or free.

To give this instrument its full effect, stones of such a size as not to pass freely between the teeth ought to be carried off, and clods of that size ought to be broken. The ground ought to be dry, which it commonly is in the month of May.

In preparing for barley, turnip, or other summer-crop, begin with ploughing and cross-ploughing. If the ground be not sufficiently pulverized, let the great brake be applied, to be followed successively with the 1st and 2d harrows. In stiff soil, rolling may be proper. Plate VI. or twice between the acts. These operations will loosen every root, and bring some of them to the surface.

(1) In his Gentleman Farmer, to which performance the practical part of this article is materially indebted.
Part II.

AGRICULTURE.

Practice.

This is the time for the 3d harrow, conducted by a boy mounted on one of the horses, who trots smartly along the field, and brings all the roots to the surface: there they are to lie for a day or two, till perfectly dry. If any stones or clods remain, they must be carried off in carts. And now succeeds the operation of the cleaning harrow. It is drawn by a single horse, directed by reins, which the man at the opposite corner puts over his head, in order to have both hands free. In this corner is fixed a rope, with which the man from time to time raises the harrow from the ground, to let the weeds drop. For the sake of expedition, the weeds ought to be dropped in a straight line across the field, whether the harrow be full or not; and seldom is a field so dirty but that the harrow may go 30 yards before the teeth are filled. The weeds will be thus laid in parallel rows, like those of hay raked together in rows. The weeds will be thus laid in parallel rows, like those of hay raked together in rows. The weeds will be thus laid in parallel rows, like those of hay raked together in rows. The weeds will be thus laid in parallel rows, like those of hay raked together in rows. The weeds will be thus laid in parallel rows, like those of hay raked together in parallel rows, like those of hay raked together in parallel rows, like those of hay raked together in parallel rows, and then the weeds may be carried clean off, as to admit the view, this way of cleaning land will appear operose; but upon trial, neither the labour nor expense will be found immediate. At any rate, the labour and expense ought not to be grudged; for if a field be once thoroughly cleaned, the weeds must be very few, or the farmer very indolent, to make it necessary to renew the operation in less than 20 years. In the worst feasons, a few years pasture is always under command; which effectually destroys triennial plants, such as thistles and couch-grasses. The horse-hoeing will clean and prepare the surface for the 3d harrow, ploughed up the land, and in the beginning of September sow three bushels of rye per acre, either to feed off the sheep in the spring or to stand for harvest. If you feed it off, sow winter vetches in August or September, and make them into hay the following summer. Then get the land into fine tillage as possible, and sow it with fain-foin, which, with a little manure once in two or three years, will remain and produce good crops for 20 years together. Light poor land, which seldom produces good crops of anything till well manured. After it is well ploughed, sow three bushels of buck-wheat per acre, in April or May: When in bloom, let your cattle lie in a few days to eat off the beet, and tread the other down; this done, plough in what remains immediately. This will soon ferment and rot in the ground; then lay it fine, and sow three bushels of rye per acre. If this can be got off early enough, sow turnips; if not, winter vetches to cut for hay. Then get in it good tillage and sow turnip-rooted cabbages, in rows three feet apart. This plant seldom fails, if it has sufficient room, and the intervals be well horeshoe'd; and you will find it the beet spring-feed for sheep when turnips are over. The horse-hoeing will clean and prepare the land for fain-foin; for the sowing of which April is reckoned the best season. The usual way is to sow it broad-cast, four bushels to an acre; but the writer prefers sowing it in drills two feet asunder, for then it may be horse-hoed, and half the seed will be sufficient.

5. On the Nature of Different Kinds of Soils, and the Plants proper to each.

1. Clay, which is in general the stiffest of all soils, and contains an unctuous quality. But under the term clays, earths of different sorts and colours are included. One kind is so offensive, that scarcely any thing will subdue it; another is so hungry and poor, that it absorbs whatever is applied, and turns it into its own quality. Some clays are thinner than others, and the fatte is the best; some are more soft and slippery. But all of them retain water poured on their surfaces, where it flags, and chills the plants, without sinking into the soil. The Kloven of clay prevents the roots and fibres of plants from spreading in search of nourishment. The blue, the red, and the white clay, if strong, are unfavourable to vegetation. The flavy and looser clays are less so; but none of them are worth any thing till their texture is so loosened by a mixture of other substances, and opened, as to admit the influence of the sun, the air, and frosts. Among the manures recommended for clay, sand is of all others to be preferred; and fia-sand the best of all where it can be obtained: This most effectually breaks the cohesion.

The reason for preferring sea-sand is, that it is not formed wholly (as most other sands are) of small stones; but contains a great deal of calcareous matter in it, such as, shells grated and broken to pieces by the tide; and also of salts. The smaller the sand is the more easily it penetrates the clay; but it abides less time in it than the larger.

The next best land is that washed down by rains on gravelly soils. Those which are dry and light are the worst. Small gritty gravel has also been recommended by the best writers on agriculture for these soils; and in many instances we have found them to answer the purpose.

Shell-marle, ashes, and all animal and vegetable substances, are good manures for clay; but they have been found most beneficial when sand is mixed with them. Lime has been often used, but the writer of this section would not recommend it, for he never found any advantage from it, when applied to clays.

The crops most suitable for such lands are, wheat, beans, cabbages, and rye-grass. Clover seldom succeeds, nor indeed any plants whose roots require depth, and a wide spread in the earth.

2. Chalk. Chalky soils are generally dry and warm, and if there be a tolerable depth of mould, fruitful; producing great crops of barley, rye, peas, vetches, clover, trefoil, burnet, and particularly fain-foil. The latter plant flourishes in a chalky soil better than any other. But if the surface of mould be very thin, this soil requires good manuring with clay, marle, loam, or dung. As these lands are dry, they may be sown earlier than others.

When your barley is three inches high, throw in 10 lb. of clover, or 15 lb. of trefoil, and roll it well. The next summer mow the crop for hay; feed off the aftermath with sheep; and in winter give it a top-drying of dung. This will produce a crop the second spring, which should be cut for hay. As soon as this crop is carried off, plough up the land, and, in the beginning of September, sow three bushels of rye per acre, either to feed off the sheep in the spring or to stand for harvest. If you feed it off, sow winter vetches in August or September, and make them into hay the following summer. Then get the land into fine tillage as possible, and sow it with fain-foil, which, with a little manure once in two or three years, will remain and produce good crops for 20 years together.

3. Light poor land, which seldom produces good crops of anything till well manured. After it is well ploughed, sow three bushels of buckwheat per acre, in April or May: When in bloom, let your cattle lie in a few days to eat off the beet, and tread the other down; this done, plough in what remains immediately. This will soon ferment and rot in the ground; then lay it fine, and sow three bushels of rye per acre. If this can be got off early enough, sow turnips; if not, winter vetches to cut for hay. Then get in it good tillage and sow turnip-rooted cabbages, in rows three feet apart. This plant seldom fails, if it has sufficient room, and the intervals be well horseshoe'd; and you will find it the beet spring-feed for sheep when turnips are over.
The horse-hoeing will not only clean the crop, but
earth up the plants, and render them more luxuriant
and lasting.

If you sow it broad-cast, give it a top-dressing in
December or January, of roten dung, or ashes, or
which is still better, of both mixed up in compost.

From various trials, it is found that taking only one
crop in a year, and feeding the after-growth, is better
than to mow it twice. Cut it as soon as it is in full
bloom, if the weather will permit. The hay will be
the sweeter, and the strength of the plants less im-
paired, than if it flanks till the feed is formed.

4. Light rich land, being the most easy to cultivate
to advantage, and capable of bearing most kinds of
grain, pulse, and herbage, little need be said upon it.

One thing however is very proper to be observed, that
such lands are best adapted to the drill husbandry,
especially where machines are used, which require shal-
low furrows to be made for the reception of the feed.

This, if not prone to coach-grafts, is the best of all
soils for lucerne; which, if sown in two feet drills, and
kept clean, will yield an astonishing quantity of the
most excellent herbage. But lucerne will never be cul-
tivated to advantage where coach-grafts and weeds
are very plentiful; especially where machilles are used, which
be cultivated to advantage where couch-grafs and weeds
are very plentiful; and to mend it, that it
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Part II. AGRICULTURE.

Practice. — that have sprung from the last stirring. The destruction of weeds is a capital article in fallowing; yet to blind are people to their interest, that nothing is more common than a fallow field covered with charlock and wild mustard, all in flower, and 10 or 12 inches high. The field having now received two harrowings and two breakings, is prepared for manure, whether lime or dung, which without delay ought to be incorporated with the soil by a repeated harrowing and a gathering furrow. This ought to be about the beginning of September, and as soon after as you please the seed may be sown.

As in ploughing a clay soil it is of importance to prevent poutching, the hinting furrows ought to be done with two hoofs in a line. If four ploughs be employed in the same field, to one of them may be allotted the care of finishing the hinting furrows.

Loam, being a medium between sand and clay, is of all soils the fittest for culprits, and the least subject to changes. It does not hold water like clay; and when wet, it dries sooner. At the same time, it is more retentive than sand of that degree of moisture which promotes vegetation. On the other hand, it is more subject to couch-grasses than clay, and to other weeds; to destroy which, fallowing is still more necessary than in clay.

Beginning the fallow about the first of May, or as soon as barley-feed is over, take as deep a furrow as the soil will admit. Where the ridges are low and narrow as that the crown and furrow can be changed alternately, there is little or no occasion for water furrowing. Where the ridges are so high as to make it proper to cleave them, water-furrowing is proper. The second ploughing may be at the distance of five weeks. Two crops of annuals may be got in the interim, the first by the brake and the next by the harrow; and by the same means eight crops may be got in the season.

The ground must be cleared of couch-grasses and knot-grass roots, by the cleaning harrow described above. The time for this operation is immediately before the manure is laid on. The ground at that time being in its loofest state, parts with its grass roots more freely than at any other time. After the manure is spread, and incorporated with the soil by breaking or harrowing, the seed may be sown. If the ground is strongly harrowed, it is drawn so easily to carry off the moisture. To leave it rough without harrowing has two advantages: it is not apt to cake with moisure, and the inequalities make a sort of shelter to the young plants against frost. But if it lie flat, it ought to be smoothed with a light harrow after the seed is sown, which will facilitate the course of the rain from the crown to the furrow.

A sandy soil is too loose for wheat. The only chance for a crop is after red clover, the roots of which bind the soil; and the instructions above given for loam are applicable here. Rye is a crop much fitter for sandy soil than wheat; and, like wheat, is generally sown after a summer-fallow.

Lastly, sow wheat as soon in the month of October as the ground is ready. When sown a month more early, it is too farward in the spring, and apt to be hurt by frost; when sown a month later, it has not time to root before frost comes on, and frost spoils it out of the ground.

Setting of wheat, a method which is reckoned one of the greatest improvement in husbandry that has taken place this century. It seems to have been first suggested by planting grains in a garden from mere curiosity, by persons who had no thought or opportunity of extending it to a lucrative purpose. Nor was it attempted on a larger scale, till a little farmer near Norwich began it about 17 years since, upon less than an acre of land. For two or three years only a few followed his example; and those were generally the butt of their neighbours meritment for adopting so singular a practice. They had, however, considerably better corn and larger crops than their neighbours: this, together with the saving in feed, engaged more to follow them: while some ingenious persons, observing its great advantage, recommended and published its utility in the Norwich papers. These recommendations had their effect. The curiosity and inquiry of the Norfolk farmers (particularly round Norwich) were excited, and they found sufficient reason to make general experiments. Among the rest was one of the largest occupiers of lands in this county, who set 57 acres in one year. His successes, from the visible superiority of his crop, both in quantity and quality, was so great, that the following autumn he set 300 acres, and has continued the practice ever since. This noble experiment established the practice, a capital and was the means of introducing it generally among improve the intelligent farmers in a very large district of land; men in a there being few who now sow any wheat, if they can agriculture, procure hands to set it. It has been generally observed, that although the set crops appear very thin during the autumn and winter, the plants thicker and spread prodigiously in the spring. The ears are indisputably larger, without any dwarfish or small corn; the grain is of a larger bulk, and specifically heavier per bushel than when sown.

The land on which this method is particularly pro Method, is either after clover, flable, or on which trefoil and grafs-feed were sown the spring before the land. These grounds, after the usual manuring, are once turned over by the plough in an extended flag or turf, at ten inches wide; along which a man, who is called a dibber, with two setting-irons, somewhat bigger than ram-roads, but considerably bigger at the extremity, steps backwards along the turf and makes the holes about four inches asunder every way, and an inch deep. Into these holes the droppers (women, boys, and girls) drop two grains, which is quite sufficient. After this, a gate buffalo with thorns is drawn by one horse over the land, and closes up the holes. By this mode, three pecks of grain is sufficient for an acre; and being immediately buried, it is equally removed from vermin or the power of frost. The regularity of its raising gives the best opportunity of keeping it clear from weeds, by weeding or hand-hoeing.

Wheat-setting is a method peculiarly beneficial when peculiar corn is dear; and, if the season be favourable, may be advantage of extended with great benefit to the farmer. Sir Thomas Beever of Hatchel-Hall in Norfolk, found the produce to be two bushels per acre more than from the wheat which is sown; but having much less small corn intermixed with it, the sample is better, and always fetches a higher price, to the amount generally of two shillings per quarter.
This method, too, favors to the farmer and to the public six pecks of feed-wheat in every acre; which, if nationally adopted, would do itself afford bread for more than half a million of people.

Add to these considerations, the great support given to the poor by this second harvest, as it may be called, which enables them to diminish their rents and maintain their families without having recourse to the parish. The expense of fattening by hand is now reduced to about ten shillings per acre; which, in good weather, may be done by one dibbler, attended by three droppers, in two days. This is five shillings per day; of which, if the dibbler gives to the children sixpence each, he will have himself three shillings and sixpence for his day's work, which is much more than he can possibly earn by any other labour so easy to himself. But put the case, that the man has a wife who dabbles with him, and two or three of his own children to drop to him, you see his gains will then be prodigious, and enough to ensure a plenty of candidates for that work, even in the least populous parts of the country.

It is, however, to be observed with regard to this method, that in seasons when feed-corn is very cheap, or the autumn particularly unfavourable to the practice, it must certainly be baffled. In light lands, for instance, a very dry time prevents dibbling; as the holes made with the instruments will be filled up again by the mould as fast as the instrument is withdrawn. So, again, in a very wet season, on strong and stiff clays, the feet in the dibblers cannot be made to penetrate the earth thus drawn over them. But these extremes of dry and wet do not often happen, nor do they affect lands of a moderately confined texture, or both light and heavy soils at the same time, so that the general practice is in fact never greatly impeded by them.

**Propagating of wheat by dividing and transplanting its roots.** In the Philosophical Transactions for 1768, we have a very extraordinary experiment, of which the following is an abstract. On the 2d of June 1766, Mr C. Miller sowed some grains of the common red wheat; and on the 8th of August a single plant was taken up and separated into 18 parts, and each part was then observed to tiller. These plants having been divided into several side-shoots, by about the middle of September some of them were then taken up and divided, and the rest of them between that time and the middle of October. This second division produced 67 plants. These plants remained through the winter, and another division of them, made between the middle of March and the 10th of April, produced 500 plants. These were then divided no further, but permitted to remain. The plants were in general stronger than any of the wheat in the fields. Some of them produced upwards of 180 ears from a single root. Many of the ears measured ten inches in length, and contained between 60 and 70 grains.

The whole number of ears which, by the process above mentioned, were produced from one grain of wheat, was 21,109, which yielded three pecks and three quarters of clear corn, the weight of which was 27 lb. 7 ounces; and from a calculation made by counting the number of grains in an ounce, the whole number of grains was about 570,820.

By this account we find, that there was only one general division of the plants made in the spring. Had a second been made, Mr Miller thinks the number of plants would have amounted to 2,000 instead of 500, and the produce thereby much enlarged.

The ground was a light black earth, upon a gravelly bottom; and consequently, a bad foil for wheat. One half of the ground was well dunged, the other half had no manure. There was, however, not any difference discoverable in the vigour, or growth, or produce, of the plants.

It must be evident, that the expense and labour of setting in the above manner by the hand, will render it impracticable upon a large scale so as to be productive of any utility. A correspondent of the Bath Society, therefore (Robert Bogle, Esq. of Baldowin, near Glasgow), with a view to extend the practice, has proposed the use of the harrow and roller until some better implements be invented. This method occurred to him from attending to the practice usual with farmers on certain occasions, of harrowing their fields after the grain is sprung up. Upon investigating the principles upon which these practices are founded, he found them confined merely to that of pulverizing the earth, without any attention to Mr Miller's doctrine. They said, "that after very heavy rains, and then exceltive dry weather, the surface of their lands were apt to be caked, the tender fibres of the young roots were thereby prevented from pushing; and of course the vegetation was greatly obstructed; in such infatuates, they found very great benefit from harrowing and rolling."

These principles he acknowledges to be well founded, so far as relates to pulverizing; but contends, that the benefit arising from harrowing and rolling is not derived from pulverizing entirely, but also from subdividing and enabling the plants to tiller (as it is termed). "The harrow (he observes) certainly breaks the incrustation on the surface, and the roller crumbles the clods; but it is also obvious, that the harrow removes a great many of the plants from their original situations; and that if the corn has begun to tiller at the time it is used, the roots will be, in many instances, subdivided, and then the application of my system of subdivision comes into play. The roller then serves to plant the roots which have been torn up by the harrow."

But on this the Society observe, that the teeth of a objections.

harrow are too large to divide roots so small and numerous as are those of grain; and whenever such roots (however tillered) stand in the line any tooth makes, they will, if small, be only turned on one side by the earth yielding to their lateral pressure, or, if large, the whole root will probably be drawn out of the ground. The principal offices, therefore, derived from harrowing and rolling these crops are, opening the soil between the plants, earthing them up, breaking the clods, and closing the earth about their roots.

In a subsequent letter, Mr Bogle, without contesting these points, further urges the scheme of propagating wheat by dividing and transplanting its roots. "I have conversed (says he) much with many practical farmers, who all admit that my plan has the appearance not only of being practical, but advantageous. I have also seen in the ninth number of Mr Young's Annual of Agriculture, the account of an experiment which strongly corroborates my theory. It was made by the Rev. Mr Pike of Edmonton. From this, and other experiments
experiments which have been made under my own eye, I foresee clearly, that the system is practicable, and will certainly be productive of great benefit, should it become general. Besides the saving of nine-tenths of feed in the land sown broad-cast, other very important advantages will attend the setting out of wheat from a feed-bed, such as an early crop; the certainty of good crops; rendering a thinner fallow unnecessary; saving dung; and having your wheat perfectly free from weeds without either hand or horse-hoeing. Five hundred plants in April produced almost a builch of grain. My gardener says, he can set one thousand plants in a day, which is confirmed by the opinion of two other gardeners. Mr Miller found no difference in the produce of what was planted on lands that had dung, and on what had none, except where the land was improper for wheat at all."

Upon the same subject, and that of harrowing all kinds of corn, we are informed, Mr Bogle, afterwards communicated to the Society his thoughts more at large, together with authentic accounts which were made at his instance, and which were attended with very great success. These, however, were received too late for publication in the last (3d) volume of their papers. But the Society, conceiving his system may be attended with considerable advantages if brought into general practice, have given, at the end of the volume, a few of his leading principles. Mr Bogle states.

1. That he has known many instances of very great crops having been obtained by harrowing fields of corn after they were sown; and therefore recommends the practice very warmly.

2. That he has also received an authentic account of one instance where the same good effects were produced by ploughing the field.

3. On the system of transplanting, he states, that a very great proportion of the feed will be saved, as a farmer may have a nursey, or small patch of plants, from which his fields may be supplied; he calculates that one acre will yield plants sufficient for 100 acres.

4. That a very great increase of crops may be obtained by this method, probably a double crop, may perhaps a triple quantity of what is reaped either by drilling, or by the broad-cast husbandry.

5. That a great part of the labour may be performed by infants, men and women, and also by children, who are at present supported by the parish charity; and that of course the poor's rates may be considerably reduced.

6. That the expense will not exceed from 20s. to 30s. per acre, if the work be performed by able-bodied men and women; but that it will be much lower, if that proportion of the work which may be done by employing young boys and girls should be allotted to them.

7. That in general he has found the distance of nine inches every way a very proper distance for setting out the plants at; but recommends them to be tried at other spaces, such as six, eight, or even 12 inches.

8. That he conceives an earlier crop may be obtained in this manner than can be obtained by any other mode of cultivation.

9. That a clean crop may also be procured in this way, because if the land be ploughed immediately before the plants are set out, the corn will spring much quicker from the plants than the weeds will do from their seeds, and the corn will thereby bear down the growth of the weeds.

10. That such lands as are overflowed in the winter and spring, and are of course unfit for sowing with wheat in the autumn, may be rendered fit for crops of wheat by planting them in the spring, or even in the summer.

11. That he has known instances of wheat being transplanted in September, October, November, February, March, April, and even as late as the middle of May, which have all answered very well.

12. That he has known an early kind of wheat, known as late as the middle of May, which has ripened in very good time; and from that circumstance he conceives, if the plants should be taken from that early kind, the feafon of transplanting might be prolonged at least till the first of July, perhaps even later.

13. That he has reason to think wheat, oats, and barley, are not annuals, but are perennials, provided they are eaten down by cattle and sheep, or are kept low by the fycythe or sickle; and are prevented from sprouting or coming to the ear.

14. That one very prevalent motive with him in prosecuting this plan, is, that he is of opinion it may enable government to devise means of supporting the vagrant poor, both old and young, who are now to meet with everywhere, both in towns and in the country, and who are at present a burden on the community; but if such employment could be struck out for them, a comfortable subsistence might be provided for them by means of their own labour and industry; and not only save the public and private charitable contributions, but may also render that class of people useful and profitable subjects; instead of their remaining in a state of beggary, distress, and perhaps a prodigal and vicious course of life.

Lately, Mr Bogle had hinted at a secondary object, which
which he has in view, from this mode of cultivation, which he apprehends may in time, with a small degree of attention, prove extremely advantageous to agriculture.—It is, that in the first place, the real and intrinsic value of different kinds of grain may be more accurately ascertained by making a comparison of it with a few plants of each kind set out at the same time, than can be done when grown in drills or broad-cast; and when the most valuable kinds of wheat, oats, or barley, are discovered, he states, that in a very short time (not exceeding four or five years) a sufficient quantity of that valuable kind may be procured to supply the kingdom with feed from a single grain of each kind; for he calculates, that 47,000 grains of wheat may be produced by divisibility in two years and three months.

Upon these propositions the Society observes, "That although Mr Bogle appears to be too sanguine in his expectations of seeing his plan realized in general practice, it certainly merits the attention of Gentlemen Farmers. We with them to make fair experiments, and report their successes. Every grand improvement has fairly originated with gentlemen; and thence the circle spreads, and separates them from each other. In the view, from which we may be induced to build upon the crown of the earth, it is, that of its place, and separates them from each other. In this form to clay-foil in particular, there is no rule in nature. It is probably a native of Britain: it will grow on the worst soil with very little preparation. For that reason, before turnip was introduced, it was always the first crop upon land broken up from the state of nature. Upon such land, may it not be a good method, to build upon the crown of every ridge, in the form of a wall, all the surface-earth, one sod above another, as in a fold for sheep? After standing in this form all the summer and winter, let the walls be thrown down, and the ground prepared for oats. This will secure better to summer-fallow and to low, when in the autumn. But the preferable method, especially in clay-foil, is to turn over the field after harvest, and to lay it open to the influences of frost and air, which lessens the tenacity of clay, and reduce it to a free mould. The surface-foil by this means is finely mellowed for reception of the seed; and it would be a pity to bury it by a second ploughing before sowing. In general, the bulk of clay-foils are rich; and skillful ploughing without dung, will probably give a better crop, than unskillful ploughing with dung.

Effect of frosts upon tilled land.

As winter-ploughing enters into the culture of oats, we must remind the reader of the effect of frost upon tilled land. Providence has neglected no region intended for the habitation of man. If in warm climates the soil be mellowed by the sun, it is no less mellowed by frost in cold climates. Frost acts upon water, by expanding it into a larger space. Frost has no effect upon dry earth; witness sand, upon which it makes no impression. But upon wet earth it acts most vigorously: it expands the moisture, which requiring more space puts every particle of the earth out of its place, and separates them from each other. In that view, frost may be considered as a plough superior to any that is made, or can be made, by the hand of man: its action reaches the minutest particles; and, by dividing and separating them, it renders the soil loose and friable. This operation is the most remarkable in tilled land, which gives free access to frost. With respect to clay-foil in particular, there is no rule in husbandry more essential than to open it before winter in hopes of frost. It is even advisable in a clay-foil to leave the stubble rank; which, when ploughed in before winter, keeps the clay loose, and admits the frost into every cranny.

To apply this doctrine, it is dangerous to plough clay-foil when wet: because water is a cement for clay, and binds it so as to render it unfit for vegetation. It is, however, less dangerous to plough wet clay before winter than after. A succeeding frost corrects the bad effects of such ploughing; a succeeding drought increases them.

The common method, is to sow oats on new-ploughed land in the month of March, as soon as the ground is tolerably dry. If it continues wet all the month of March, it is too late to venture them after. It is much preferable method of in the early spring, which seldom happens before the first of March, and the seed is sown as soon as the ground is sufficiently dry for its reception. Frost has a stronger effect on such clays than on natural clay. And if the field be laid open before winter, it is rendered so loose by frost as to be soon drenched in water. The particles at the same time are so small as that the first drought in spring makes the surface clay or crust. The difficulty of reducing this crust into mould for covering the oat-seed, has led farmers to delay ploughing till the month of March. But we are taught by experience, that this soil ploughed before winter, is sooner dry than when the ploughing is delayed till spring; and as early sowing is a great advantage, the objection of the superficial crustling is easily removed by the firr harrow above described, which will produce abundance of mould for covering the seed. The ploughing before winter not only produces early sowing, but has another advantage: the surface-foil that had been mellowed during winter by the sun, frost, and wind, is kept above.

The drelling a loamy soil for oats differs little from drelling a clay-foil, except in the following particular, that being less hurt by rain, it requires not high ridges, and therefore ought to be ploughed crown and furrow alternately.

Where there is both clay and loam in a farm, it is obvious from what is said above, that the ploughing of the clay after harvest ought first to be dispatched. If both cannot be overaken that reason, the loam may be delayed till the spring with less hurt.

Next of a gravelly soil; which is the reverse of clay, as it never suffers but from want of moisture. Such a soil ought to have no ridges; but be ploughed circularly from the centre to the circumference, or from the circumference to the centre. It ought to be tilled after harvest: and the first dry weather in spring ought to be laid hold of to sow, harrow, and roll; which will preserve it in sap.

The culture of oats is the simplest of all. That grain is probably a native of Britain: it will grow on the worst soil with very little preparation. For that reason, before turnip was introduced, it was always the first crop upon land broken up from the state of nature. Upon such land, may it not be a good method, to build upon the crown of every ridge, in the form of a wall, all the surface-earth, one sod above another, as in a fold for sheep? After standing in this form all the summer and winter, let the walls be thrown down, and the ground prepared for oats. This will secure...
Agriculture

Practice.

secure one or two good crops; after which the land may be dished for a crop of barley and grass-seeds. This method may answer in a farm where manure is scanty.


Culture of barley.

This is a culmiferous plant that requires a mellow soil. Upon that account, extraordinary care is requisite, where it is to be sown in clay. The land ought to be stirred immediately after the foregoing crop is removed, which lays it open to be mellowed with the froth and air. In that view, a peculiar sort of ploughing has been introduced, termed ribbing; by which the greatest quantity of surface possible is exposed to the air and froth. The obvious objection to this method is, that half of the ridge is left unmoved. And to obviate that objection, the following method is offered, which moves the whole soil, and at the same time exposes the same quantity of surface to the froth and air.

Ribbing.

As soon as the former crop is off the field, let the ridges be gathered with as deep a furrow as the soil will admit, beginning at the crown and ending at the furrow. This ploughing loosens the whole soil, giving free access to the air and froth. Soon after begin a second ploughing in the following manner. Let the field be divided by parallel lines across the ridges, with intervals of 30 feet or so. Plough once round an interval, beginning at the edges, and turning the earth toward the middle of the interval; which covers a foot or so of the ground formerly ploughed. Within that foot plough another round similar to the former; and after that, other rounds, till the whole interval be finished, ending at the middle. Instead of beginning at the edges, and ploughing toward the middle, it will have the same effect to begin at the middle and to plough toward the edges. Plough the other intervals in the same manner. As by this operation the furrows of the ridges will be pretty much filled up, let them be cleared and water-furrowed without delay. By this method, the field will be left waving like a plot in a kitchen-garden, ridged up for winter. In this form, the field is kept perfectly dry; for beside the capital furrows that separate the ridges, every ridge has a number of crofs furrows that carry the rain instantly to the capital furrows. In hanging grounds retentive of moisture, the parallel lines abovementioned ought not to be perpendicular to the furrows of the ridges, but to be directed a little downward, in order to carry rain-water the more hastily to these furrows. If the ground be clean, it may lie in that state winter and spring, till the time of feed-furrowing. If weeds happen to rise, they must be destroyed by ploughing, or breaking, or both; for there cannot be wore husbandry, than to put feed into dirty ground.

This method resembes common ribbing in appearance, but is very different in reality. As the common ribbing is not preceded by a gathering furrow, the half of the field is left tilltild, compact as when the former crop is removed, impervious in a great measure to air or froth. The common ribbing at the same time removes the rain-water on every ridge, preventing it from descending to the furrows; which is hurtful in all soils, and poisonous in clay soil. The flitching here described, or ribbing, if you please to call it so, prevents these noxious effects. By the two ploughings the whole field is opened, admitting freely air and froth; and the multitude of furrows lays the surface perfectly dry, giving an early opportunity for the barley seed.

But further, as to the advantage of this method: When it is proper to sow the feed, all is laid flat with the brake, which is in easy operation upon the soil that is dry and pulverized; and the feed-furrow which succeeds, is so shallow as to bury little or none of the surface earth; whereas the flitching for barley is commonly done with the deepest furrow; and consequently buries all the surface-soil that was mellowed by the froth and air. Nor is this method more expensive; because the common ribbing must always be followed with a feed furrow in a flitching furrow, which is favored in the method recommended. Nay, its less expensive; for after common ribbing, which keeps in the rain water, the ground is commonly sowed, as to make the flitching a laborious work.

It is well known that barley is less valuable when it does not ripen equally; and that barley which comes up speedily in a dusty soil, most gains a great advantage over feed-weeds. Therefore, first take out about one-third of the contents of the socks of feed barley or bear, to allow for the swelling of the grain. Lay the socks with the grain to steep in clean water; let it lie covered with it for at least 24 hours. When the ground is so dry as at present, and no likelihood of rain for 10 days, it is better to lie 36 hours. Sow the grain wet from steeping, without any addition of powdered quick-lime, which, though often recommended in print, can only poison the feed, suck up part of its useful moisture, and burn the hands of the lower. The feed will flavor better, as clean water has no tenacity; only the lower must put in a fourth or a third more feed in bulk than usual of dry grain, as the grain is swelled in that proportion: narrow it in as quickly as possible after it is sown; and though not necessary, give it the benefit of fresh furrow, if convenient. You may expect it up in a fortnight; at farthest.

The following experiment by a correspondent of the Bath society being considered as a very interesting one, is here subjoined.

"The last spring (1782) being remarkably dry, I foaked my feed-barley in the black water taken from a experimenter which constantly receives the drainage of my meadows on dung-heap and stables. As the light corn floated on the top, I skimmed it off, and let the rest stand 24 hours. On taking in the water, I mixed the feed grain with a sufficient quantity of filled wood-ashes, to make it sper regularly, and sowd three fields with it. I began sowing the 16th, and finished the 23rd of April. The produce was 60 bushels per acre, of good clean barley, without any small or green corn, or weeds at harvest. No person in this country had better grain. I sowed also several other fields with the same feed dry, and without any preparation; but the crop, like those of my neighbors, was very poor; not more than twenty bushels per acre, and much mixed with good corn and weeds when harvested. I followed one of the feed dry on one ridge in each of my former fields, but the produce was very poor in comparison of the other parts of the field."

Where the land is in good order, and free of weeds, April
April is the month for fowing barley. Every day is proper, from the first to the last.

The dressing of loamy soil and light soil for barley, is the same with that described; only that to plough dry soil is not altogether so essential as in dressing clay-soil. Loamy soil or clay may be firmer a little moister; better, however, delay a week or two, than to plough when moist. Clay must never be ploughed moist, even though the season should escape altogether. But this will seldom be necessary; for not in one year out of 20 will it happen, but that clay is dry enough for ploughing some time in May. Frost may correct clay ploughed wet after harvest; but ploughed wet in the spring, it unites into a hard mass, not to be broken by hard labour.

On the cultivation of this grain we have the following observations by a Norfolk farmer.

The best soil, he observes, is that which is dry and healthy, rather light than stiff, but yet of sufficient tenacity to retain the moisture. On this kind of land the grain is always the best bodied and coloured, the nimbler in the land, and has the thinnest rind. Those are qualities which recommend it most to the maltster. If the land is poor, it should be dry and warm; and when so, it will often bear better corn than richer land in a cold and wet situation.

In the choice of your seed, it is needful to observe, that the best is of a pale lively colour, and brightness, without any deep redness, or black tinge at the tail. If the rind be a little firrved, it is the better; for that slight firrving proves it to have a thin skin, and to have sweated in the mow. The necessity of a change of feed by not sowing two years together what grew on the same soil, is not in any part of husbandry more evident than in the culture of this grain, which, if not frequently changed, will grow coarser and less capable of resisting the force of winds, or supporting themselves under heavy rains.

From our great successes in setting and drilling clover, some of our farmers tried these methods with barley; but did not find it answer their expectations, except on very rich land.

I have myself had 80 flalks on one root of barley, which all produced good and long ears, and the grain was better than any other, but the method is too expensive for general practice. In poor land, low thin, or your crop will be worth little. Farmers who do not reason on the matter, will be of a different opinion; but the fact is indisputable.

When the barley is sowed and harrowed in, he advises that the land be rolled after the first shower of rain to break the clods. This will close the earth about the roots, which will be a great advantage to it in dry weather.

When the barley has been up three weeks or a month, it is a very good way to roll it again with a heavy roller, which will prevent the sun and air from penetrating the ground to the injury of the roots. This rolling, before it branches out, will also cause it to tiller into a great number of flalks; so that if the plants be thin, the ground will be thereby filled, and the flalks strengthened.

If the blade grows too rank, as it sometimes will in a warm wet spring, mowing is a much better method than feeding it down with sheep; because the slythe takes off only the rank tops, but the sheep being fond of the sweet end of the flalk next the root, will often bite it close as to injure the future growth.

4. BUCK-WHEAT.

The uses of this plant have been mentioned in the cultivation of preceding part, no. 46. It delights in a mellow sandy soil; but succeeds well in any dry loose healthy and moderately so in a free loamy stone braith. A stiff clay is its aversion, and it is entirely labour lost to sow it in a wet poachy ground. The proper season for sowing is from the last week of May or the beginning of June. It has been found, however, so early as the beginning of April, and so late as the 22d of July, by way of experiment; but the latter was rather extreme to be chosen, and the former was in danger from frost. In an experiment upon a small piece of ground, the grain of two different crops was brought to maturity in the summer 1787. After spring feedings, a crop of turnip-rooted cabbage, or vetches, there will be sufficient time to sow the land with buck-wheat. Probably, in dry summers, a crop of vetches might even be mown for hay early enough to introduce a crop of this grain after it.
Part II. AGRICULTURE.

Practice. on Brillington Common (a), having been first tolerably well cleansed from bramble, furze, &c. received one ploughing. To reduce the irregularities of the surface, it was rolled; and on the 9th of June in that year, two bullocks and a half of buck-wheat per acre were ploughed in the ground rolled again without harrowing.

The vegetation appeared in five or six days, as is constantly the case be the weather wet or dry. The growth was so rapid, that the form, with which this land greatly abounded, was completely kept under.

About the middle of September the crop was mown, but by reason of a great deal of rain that time, it was not secured until the beginning of October; hence a great deal of the grain by shedding, as well as some eaten by birds. However, there were saved about 24 Winchester bushels per acre; and, notwithstanding its long exposure to the weather, received no sort of damage, only perhaps that the fuel and molt perfect grain was the first to fall from the plant. The ground after this had almost the appearance of a fallow, and was immediately ploughed.

When it had lain a moderate time to mellowate, and to receive the influences of the atmosphere, it was harrowed, sown with Lammas wheat, and ploughed in under furrow, in a contrary direction to the first ploughing. Thus a piece of land, which in the month of April was altogether in a state of nature, in the following November was seen under a promising crop of what is well styled the king of grain, and this without the aid of manure, or of any very great degree of tillage. Nor was the harvest by any means deficient; for several persons concurring in such things estimated the produce from 26 to 30 bushels per acre. As soon as the wheat crop was taken off, the ground had one ploughing, and on the first of September following was sown with turnip-feed. The turnips were not large, but of an herbage so abundant as in the following spring to support 120 ewes with their lambs, which were fed on it by folding four weeks. After this it was manured with a composition of rotten dung and natural earth, about 20 peat loads per acre, and planted with potatoes. The crop failed for L.13.0, besides a considerable number used in the family; and a quantity referred with which ten acres were planted the following season. The ensuing autumn it was again sown both with wheat, and produced an excellent crop. In the spring of 1784, it was manured and planted with potatoes, as in the preceding instance; the crop (the tolerably good) by no means equal to the former, producing about 100 sacks per acre only. In spring 1785, the land was now for a third time under a crop of wheat; it being intended to try how far this mode of alternate cropping, one year with potatoes and another with wheat, might be carried.

From the result of the preceding and other experiments, by Nehemiah Bartley Esq. of Bridg, as detailed in the Bath Society Papers, it would seem, that the culture of this plant ought in many cases to be adopted instead of a summer-following: for the crop produced appears not only to be so much clear gain in respect to such practice, but also affords a considerable quantity of straw for fodder and manure; besides that a summer following is far from being so advantageous a preparation for a succeeding crop.

S. BEANS.

The proper fallow for beans is a deep and moift clay. There was lately introduced into Scotland a method of sowing beans with a drill-plough, and horse-hoeing the intervals; which, besides affording a good crop, is a dressing to the ground. But as that method is far from being general, we keep in the common track.

As this grain is early sown, the ground intended for it should be ploughed before winter, to give access to the root and air; beneficial in all soils, and necessary in a clay soil. Take the first opportunity after January when the ground is dry, to loosen the soil with the harrow first described, till a mould be brought up on it. Sow the feed, and cover it with the second harrow. The third will smooth the surface, and cover the feed equally. These harrows make the very best figure in sowing beans; which ought to be laid deep in the ground, not less than six inches. In clay soil, the common harrows are altogether insufficient. The mould, which has rested long after ploughing, is rendered compact and solid: the common harrows knit the surface: the feed is not covered: and the first hearty shower of rain lays it above ground. Where the farmer overtakes not the ploughing after harvest, and is reduced to plough immediately before sowing, the plough answers the purpose of the first harrow; and the other two will complete the work.

But the labour of the first harrow is ill faved; as the ploughing before winter is a fine preparation, not only for beans, but for grain of every kind. If the ground ploughed before winter happen to be of moisture to cake, the first harrow going along the ridges, and crossing them, will loosen the surface, and give access to the air for drying. As soon as the ground is dry, sow without delaying a moment. If rain happen in the interim, there is no remedy but patience till a dry day or two come.

Clay-clay, ploughed before winter, seldom fails to cake. Upon that account, a second ploughing is necessary before sowing: which ought to be performed with an ebb furrow, in order to keep the frood-mould as near the surface as possible. To cover the seed with the plough is expressed by the phrase to sow under furrow. The clods raised in this ploughing are a fort of shelter to the young plants in the chilly spring-months.

The foregoing method will answer for loam. And as for a sandy or gravelly foil, it is altogether improper for beans.

Though we cannot approve the horse-hoeing of beans, with the intervals that are commonly allotted for turnips, yet we would strongly recommend the drilling them at the distance of ten or 12 inches, and keeping the intervals clean of weeds. This may be done by hand-hoeing, taking opportunity at the same time to lay fresh foil to the roots of the plants. But as this is an expensive operation, and hands are not always to be got, a narrow plough, drawn by a single horse, might be used, with a mould-board on each side to scatter the earth

(a) A very rough piece of land, at that time just inclosed.
earth upon the roots of the plants. This is a cheap and expeditious method; it keeps the ground clean; and nourishes the plants with fresh foil.

As beans delight in a moist soil, and have no end of growing in a moist season, they cover the ground totally when sown broad cast, keep in the dew, and exclude the sun and air: the plants grow to a great height; but carry little feed, and that little not well ripened. This displays the advantage of drilling; which gives free access to the sun and air, dries the ground, and affords plenty of ripe feed.

6. Pease.

Pease are of two kinds; the white and the gray. The cultivation of the latter only belongs to this place. There are two species of the gray kind, distinguished by their time of ripening. One ripens soon, and for that reason is termed *hastfed*; the other, which is flower in ripening, is termed *cold feed*.

Pease, a leguminous crop, is proper to intervene between two culmiferous crops; i.e., for the profit of a peaef-crop, than for meliorating the ground. Pease, however, in a dry season, will produce fix or seven bolls each acre; but, in an ordinary season, they seldom reach above two, or two and a half. Hence, in a moist season, red clover feems a more beneficil crop than pease; as it makes as good winter food as pease, and can be cut green thrice during summer.

A field intended for cold feed ought to be ploughed in October or November; and in February, as soon as the ground is dry, the feed ought to be sown on the winter-furrow. A field intended for hot feed ought to be ploughed in March or April, immediately before sowing. But if infected with weeds, it ought to be also ploughed in October or November.

Pease laid a foot below the surface will vegetate; but the most approved depth is six inches in light soil, and four inches in clay soil; for which reason, they ought to be sown under furrow when ploughing is delayed till spring. Of all grain, beans excepted, they are the least in danger of being buried. Pease are sown from beans, loosing a dry soil and a dry feed. Horse-hoeing would be a great benefit, could it be performed to any advantage; but peas grow expeditiously, and soon fall over and cover the ground, which bars ploughing. Horse-hoeing has little effect when the plants are new sprung; and when they are advanced to be benefitted by that culture, their length prevents it. Fast growing at the same time is the case of their carrying too little feed; the feed is buried among the leaves; and the sun cannot penetrate to make it grow and ripen. The only practicable remedy to obtain grain, is thin sowing; but thick sowing produces more straw, and mellow the ground more. Half a ball for an English acre may be reckoned thin sowing; three fifths, thick sowing.

Notwithstanding what is said above, Mr Hunter, a noted farmer in Berwickshire, began some time ago to sow all his peas in drills; and never failed to have great crops of corn as well as straw. He sowed double rows at a foot interval, and two feet and an half between the double rows, which admit horse-hoeing. By that method, he had also good crops of beans on light land.

**Part II.**

Pease and beans mixed are often sown together, in order to catch different seasons. In a moist season, the beans make a good crop; in a dry season, the peas.

The growth of peas is commonly checked by drought in the month of July; but promoted by rain in August. In July, peas is parched; in August, it recovers verdure. Where peas are so far advanced in the dry season as that the feed begins to form, their growth is indeed checked, but the feed continues till sown. If only in the blossom at that season, their growth is checked a little; but they become vigorous again in August, and continue growing without filling till stoped by frost. Hence it is, that cold feed, which is early sown, has the best chance to produce corn; nor feed, which is late sown, has the best chance to produce straw.

The following method is practised in Norfolk, for sowing peas upon a dry light soil, immediately opened from furrow. The ground is pared with a plough extremely thin, and every furrow is laid exactly on its back. In every furrow a double row of holes is made. A pea dropt in every hole lodges in the slaty ground immediately below the seed, thrusts its roots horizontally, and has sufficient moisture. This method enabled Norfolk farmers, in the barren year 1740, to furnish white peas at 12s. per bushel.

II. Plants cultivated for Roots. [See also Art. III.]

1. Turnip.

**Turnip delights in a gravelly soil;** and there it can Culture of be raised to the greatest perfection, and with the least turnips, hazard of miscarrying. At the same time, there is no soil but will bear turnip when well prepared.

No peron ever deferred better of a country, than he who first cultivated turnips in the field. No plant is better fitted for the climate of Britain, no plant prospers better in the coldest part of it, and no plant contributes more to fertility. In a word, there has not for two centuries been introduced into Britain a more valuable improvement.

Of all roots, turnip requires the finest mould; and to that end, all harrows' bolls is the best. In order to give access to frost, the land ought to be prepared by ribbing after harvest, as above directed in preparing land for barley. If the field be not subject to annuals, it may lie in that state till the end of May; otherwise the weeds must be destroyed by a breaking about the middle of April; and again in May, if weeds rise. The first week of June, plough the field with a shallow furrow. Lime it if requisite, and harrow the lime into the soil. Draw single furrows with intervals of three feet, and lay dung in the furrows. Cover the dung sufficiently, by going round it with the plough, and forming the three-feet spaces into ridges. The dung comes thus to lie below the crown of every ridge.

The season of sowing must be regulated by the time of the season and intended for feeding. Where intended for feeding in method of November, December, January, and February, the sowing feed ought to be sown from the 1st to the 20th of June. Where the feeding is intended to be carried on to March, April, and May, the feed must not be sown till the end of July. Turnip sown earlier than above directed, flowers that very summer, and runs fast to seed; which renders it in a good measure unfit for food.
Part II.

AGRICULTURE.

Practice. Food. If sown much later, it does not apple, and there is no food but from the leaves.

Thy by a drill-plough the seed may be sown of any thickness, the safest way is to low thick. Thin sowing is liable to many accidents, which are far from being counter-balanced by the expense that is saved in thinning. Thick-sowing can bear the ravage of the black fly, and leave a sufficient crop behind. It is a protection against drought, gives the plants a rapid progress, and establishes them in the ground before it is necessary to thin them.

The sowing turnip broadcast is universal in England, and common in Scotland, though a barbarous practice. The eminent advantage of turnip is, that beside a profitable crop, it makes a most complete fallow; and the latter cannot be obtained but by horse-hoeing. Upon that account, the sowing turnip in rows at three feet distance is recommended. Wider rows answer no profitable end, straight rows afford not room for a horse to walk in. When the turnip is about four inches high, annual weeds will appear. Go round every interval with the slightest furrow possible, at the distance of two inches from each row, moving the earth from the rows toward the middle of the interval. A thin plate of iron must be fixed on the left side of the plough, to prevent the earth from falling back and burying the turnip. Next, let women be employed to weed the rows with their fingers; which is better, and cheaper done, than with the hand-hoe. The hand-hoe, besides, is apt to disturb the roots of the turnip that are to stand, and to leave them open to drought by removing the earth from them. The standing turnip are to be at the distance of twelve inches from each other; a greater distance makes them swell too much; a less distance affords them not sufficient room. A woman soon comes to be expert in finger-weeding. The following hint may be necessary to a learner. To secure the turnip that is to stand, let her cover it with the left hand; and with the right pull up the turnip on both sides. After thus freeing the standing turnip, the may safely use both hands. Let the field remain in this state until the appearance of new annuals make a second ploughing necessary; which must be in the same furrow with the former, but a little deeper. As in this ploughing the iron plate is to be removed, part of the looser earth will fall back on the roots of the plants: the rest will fill the middle of the interval, and bury every weed. When weeds begin again to appear, then is the time for a third ploughing in an opposite direction, which lays the earth to the roots of the plants. This ploughing may be about the middle of August; after which, weeds rise very faintly. If they do rise, another ploughing will clear the ground of them. Weeds that at this time rise in the row, may be cleared with a hand-hoe, which can do little mischief among plants distant twelve inches from each other. It is certain, however, that it may be done cheaper with the hand. (A) And after the leaves of turnips in a row meet together, the hand is the only instrument that can be applied for weeding.

In swampy ground, the surface of which is best reduced by paring and burning, the feed may be sown in rows with intervals of a foot. To save time, a drill-plough may be used that moves three or four rows at once. Hand-hoeing is proper for such ground; because the soil under the burnt \textit{firatum} is commonly full of roots, which digest and rot better under ground than when brought to the surface by the plough. In the mean time, while these are digesting, the alleys will secure a good crop.

In cultivating turnips to advantage, great care should be taken to procure good, bright, nimble, and well-dried feed, and of the best kinds.

The Norfolk farmers generally raise the oval white, the large green-topped, and the red or purple-topped kinds, which from long experience they have found to be the most profitable.

The roots of the green-topped will grow to a large size, and continue good much longer than others. The red or purple-topped will also grow large, and continue good to the beginning of February; but the roots become hard and stringy sooner than the former.

The green-topped growing more above ground, is of more danger of fulfilling injury from feverer frosts than the red or purple, which are more than half covered by the soil; but it is the ffootest and sweetest, when grown large, of any kind. We have seen them brought tolerable a foot in diameter, and equally good as garden turnips.

Turnips delight in a light soil, consisting of sand and loam mixed; for when the soil is rich and heavy, although the crop may be as great in weight, they will be rank, and run to flower earlier in spring. Turnip-feed, like that of grain, will not do well without frequent changing. The Norfolk feed is sent to most parts of the kingdom, and even to Ireland, but after two years it degenerates; so that those who wish to have turnips in perfection should procure it fresh every year from Norwich, and they will find their account in so doing. For from its known reputation, many of the London feedmen fell, under that character, feed raised in the vicinity of the metropolis, which is much inferior in quality.

When the plants have got five leaves, they should be hoed, and set out at least six inches apart. A month afterward, or earlier if it be a wet season, a second hoeing should take place, and the plants be left at least 14 inches distant from each other, especially if intended for feeding cattle; for where the plants are left thicker, they will be proportionably smaller, unless the land is very rich indeed.

Some of the best Norfolk farmers sow turnips in drills three feet asunder, and at a second hoeing leave them a foot apart in the rows. By this means the trouble and expense of hoeing is much lessened, and the crop of equal weight as when sown in the common method of sowing.
AGRICULTURE.

Part II.

first prejudiced against the practice) are now come into it, and find their account in so doing.

2. POTATOES.

The choice of soil is not of greater importance in any other plant than in a potato. This plant in clay soil, or in rank black loam lying low without ventilation, never makes palatable food. In a gravelly or sandy soil, exposed to the sun and to free air, it thrives to perfection, and has a good relish. But a rank black loam, though improper to raise potatoes for the table, produces them in great plenty; and the product is, as already observed, a palatable food for horned cattle, hogs, and poultry.

The spade is a proper instrument for raising a small quantity, or for preparing corners or other places inaccessible to the plough; but for raising potatoes in quantities, the plough is the only instrument.

As two great advantages of a drilled crop are, to destroy weeds, and to have a fallow at the same time with the crop, no judicious farmer will think of raising potatoes in any other way. In September or October, as soon as that year's crop is removed, let the field have a rolling furrow, a cross-breaking next, and then be cleared of weeds by the cleaning harrow. Form it into three-foot ridges, in that state to lie till April, which is the proper time for planting potatoes. Cross-brake it, to raise the furrows a little. Then the well-digested horse-dung along the furrows, upon which lay the roots at eight inches distance. Cover up the roots with the plough, going once round every row. This makes a warm bed for the potatoes; has dung below, and a loose covering above, that admits every ray of the sun. As soon as the plants appear above ground, go round every row a second time with the plough, which will lay upon the plants an additional inch or two of mould, and at the same time bury all the tops. This will complete the ploughing of the ridges. When the potatoes are six inches high, the plough, with the deepest furrow must go twice along the middle of each interval in opposite directions, laying earth first to one row, and next to the other. And to perform this work, a plough with a double mould-board will be more expeditious. But as the earth cannot be laid close to the roots by the plough, the spade must succeed, with which four inches of the plants must be covered, leaving little more but the tops above ground; and this operation will at the same time bury all the weeds that have sprung since the former ploughing. What weeds arise after must be pulled up with the hand. A hoe is never to be used here: it cannot go so deep as to destroy the weeds without cutting the fibres of the plants; and if it skim the surface, it only cuts off the heads of the weeds, and does not prevent their pushing again.

In the Bath Society Papers, we have the following particular practical observations on the culture and use of potatoes, given as the result of various experiments made for five years successively on that valuable root, the growth of which cannot be too much encouraged.

When the potatoe crop has been the only object in view, the following method is the most eligible.

The land being well pulverized by two or three good harrowings and ploughings, is then manured with 15 or 20 cart-loads of dung per acre, before it receives its
Part II.

Agriculture.

Practice. Left earth. Then it is thrown on to what the Suffolk farmers call the Trench-back, which is narrow and deep ridge-work, about 15 inches from the centre of one ridge to the centre of the other. Women and children drop the sets in the bottom of every furrow 15 inches apart; men follow, and cover them with large holes, a foot in width, pulling the mould down so as to bury the sets five inches deep; they must receive two or three hand-hoeings, and be kept free from weeds; always observing to draw the earth as much as possible to the stems of the young plants. By repeated trials, the first or second week in April is found the most advantageous time for planting.

In the end of September or the beginning of October, when the haulm becomes withered, they should be ploughed up with a strong double breasted-plough. The workman must be cautious to set his plough very deep, that he may strike below all the potatoes, to avoid damaging the crop. The women who pick them up, if not carefully attended to, will leave many in the ground, which will prove detrimental to any succeeding corn, whether wheat or barley. To avoid which inconvenience, let the land be harrowed, and turn the swine in to glean the few that may be left by their negligence.

By this method, the sets will be 15 square inches from each other; it will take 19 bushels to plant an acre; and the produce, if on a good mixed loamy soil, will amount to 300 bushels.

If the potatoes are grown as a preparation for wheat, it is preferable to have the rows two feet two inches from each other; hand-hoeing only the space from plant to plant in each row; then turning a small furrow from the inside of each row by a common light plough, and afterwards with a double-breasted plough with one horse, split the ridge formed by the first ploughing thoroughly to clean the intervals. This work should not be done too deep the first time, to avoid burying the tender plants; but the land should be ploughed as deep as possible; and the closer the mould is thrown to the stems of the plants, the more advantageous it will prove. Thus 15 bushels will plant an acre, and the produce will be about 300 bushels; but the land, by the summer ploughings, will be prepared to receive feed-wheat immediately, and almost ensure a plentiful crop.

The potato-sets should be cut a week before planting, with one or two eyes each, and the pieces not very small; two bushels of fresh soaked lime should be spread over the surface of the land as soon as planted, which will effectually prevent the attacks of the grub.

The expense attending an acre of potatoes well cultivated in the first method, supposing the rent 20 shillings, tithe and town charges rather high (as in Suffolk), taking up, and every thing included, will be about six pounds. In the last method, it would be somewhat reduced.

"When predilections for old customs are fostered (adds the author), I hope to see the potato admitted in the confiant course of crops by every spirited husbandman. The most beneficial effects will, I am certain, accrue from such a system. The advantages in my neighbourhood are apparent: I cultivated and fed my own children upon them, and my poorer neighbours feebly followed the example. A great proportion of every cottage's garden is now occupied by this root, and it forms a principal part of their diet. Potatoes are cheap and excellent substitutes for peas in soups and broths, allowing double the quantity.

"Although it is nearly a transcript of the directions given by a very ingenious author, yet shall take the liberty of inserting a receipt for making a potato-soup, which I have weekly distributed amongst the poor to their great relief.

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>An ox's head</td>
<td>1</td>
</tr>
<tr>
<td>Two pecks of potatoes</td>
<td>2</td>
</tr>
<tr>
<td>Quarter of a peck of onions</td>
<td>1</td>
</tr>
<tr>
<td>Three quarters of a pound of salt</td>
<td>1</td>
</tr>
<tr>
<td>An ounce and a half of pepper</td>
<td>-</td>
</tr>
</tbody>
</table>

Total 3 10

A cheap preparation for the poor.

Ninety pints of water to be boiled with the above ingredients on a flow fire until reduced to 60, which require one peck of coals, value threepence. I have added the expense of every article according to their prices with me, that gentlemen may nearly perceive how cheap a rate they can feed 60 of their poor neighbours. I find from experience, a pint of this soup, with a small piece of the meat, is sufficient to satisfy a hearty working man with a good meal. If vegetables are plentiful, some of every sort may be added, with a few sweet herbs.

"I hope my inferring the above, will not be esteem'd improper, though somewhat deviating from the culture of potatoes, it may possibly be a means of rendering them more extensively useful."

A premium having been offered by the abovementioned Society for the cultivation of potatoes by farmers, &c. whose rent does not exceed 40l. per annum, the following methods were communicated, by which those who have only a small spot of ground may obtain a plentiful crop.

First, then, the earth should be dug 12 inches deep, if the soil will allow of it; after this, a hole should be cultivated open about six inches deep, horse-dung, or long litter should be put therein about three inches thick; this hole should not be more than 12 inches in diameter; upon this dung or litter, a potato should be planted whole, upon which a little more dung should be heaped, and then earth must be put thereon. In like manner the whole plot of ground must be planted, taking care that each potato be at least 16 inches apart; and when the young shoots make their appearance, they should have fresh mould drawn round them with a hoe; and if the tender shoots are covered, it will prevent the frost from injuring them; they should again be earthed when the shoots make a second appearance, but not be covered, as in all probability the season will then be less severe. A plentiful supply of mould should be given them, and the person who performs this business should never tread upon the plant, or the hillock that is raised round it; as the lighter the earth is, the more room the potato will have to expand. From a single root thus planted, very near 40 pounds weight of large potatoes were obtained, and from almost every other root upon the same plot of ground from 15 to 20 pounds weight; and except the soil be stony or gravelly, 10 pounds or half a peck of potatoes may almost always be obtained from each root, by pursuing
the foregoing method. But note, cuttings or small sets will not do for this purpose.

The second method will suit the indolent, or those who have not time to dig their ground, and that is, where weeds much abound and have not been cleared in the winter, a trench may be opened in a straight line the whole length of the ground, and about six inches deep; in this trench the potatoes should be planted about ten inches apart; cuttings or small potatoes will do for this method. When they are laid in the trench, the weeds that are on the surface may be pared off on each side about 10 inches from it, and be turned upon the plants; another trench should then be dug, and the mould that comes out of it turned carefully on the weeds. It must not be forgot, that each trench should be regularly dug, that the potatoes may be throughout the plot 10 or 12 inches from each other. This loveny method will in general raise more potatoes than can be produced by digging the ground twice, and dibbling in the plants; and the reason is, that the weeds light the foil, and give the roots room to expand. They should be twice hoed, and earthed up in rows. And here note, that if cut potatoes are to be planted, every cutting should have two eyes, for though fewer sets will be obtained, there will be a greater certainty of a crop, as one eye often fails or is destroyed by grubs in the earth.

Where a crop of potatoes fail in part (as will sometimes be the case in a dry season), a method may still be made by laying a little dung upon the knots of the straw or haulm of those potatoes that do appear, and covering them with mould; each knot or joint thus ordered will, if the weather prove wet afterwards, produce more potatoes than the original roots.

From the smallest potatoes planted whole, from four to six pounds at a root were obtained, and some of the single potatoes weighed near two pounds. These were dug in as before-mentioned, in trenches where the ground was covered with weeds, and the foil was a stiff loamy clay.

A good crop may be obtained by laying potatoes upon turf at about 12 or 14 inches apart, and upon beds of about six feet wide; on each side of which a trench should be opened about three feet, and the turf that comes from thence should be laid with the grassy side downward upon the potatoes; a spit of mould should next be taken from the trenches, and be spread over the turf; and in like manner the whole plot of ground that is designed to be planted must be treated. And remark, that when the young shoots appear, another spit of mould from the trenches should be fired over the beds so as to cover the shoots; this will prevent the frost from injuring them, encourage them to expand, and totally destroy the young weeds; and when the potatoes are taken up in the autumn, a careful person may turn the earth again into the trenches, so as to make the surface level; and it will be right to remark, that from the same ground a much better crop of potatoes may be obtained the following year.

For field planting, a good (if not the best) method is to dig the land, which should be once ploughed previous thereto; and when it is ploughed a second time, a careful person should drop the potato plants before the plough in every third furrow at about eight or ten inches apart. Plants that are cut with two eyes are best for this purpose. The reason for planting them at such a distance as every third furrow, is, that when the shoots appear, ahorse-hoe may go upon the two vacant furrows to keep them clean; and after they are thus hoed, they should be moulded up in ridges; and if this crop be taken up about October or November, the land will be in excellent condition to receive a crop of wheat. Lands that are full of twitch or couch-grass may be made clean by this method, as the horse-hoeing is as good as a summer-fallow: and if, when the potatoes are taken up, women and children were to pick out fitches, not any traces of it would remain; and by laying it on heaps and burning it, a quantity of ashes would be produced for manure.

After ploughing, none should ever dibble in potatoes, as the persons who dibble, plant, or hoe them, will all tread the ground; by which means it will become so bound, that the young fibres cannot expand, as has already been observed. Good crops have indeed been obtained by ploughing the land twice, and dropping the plants in every other furrow, and by hand-hoeing and earthing them up afterwards as the gardeners do peas; but this method is not equal to the other.

Vacant places in hedge-rows might be grubbed and planted with potatoes, and a good crop might be expected, as the leaves of trees, thorns, &c. are a good manure, and will most advantageously encourage their growth, and gratify the wishes of the planter; who by cultivating such places, will then make the most of his ground, and it will be in fine order to receive a crop of corn the following year.

**Account of the culture, expenses, and produce of six acres of potatoes, being a fair part of near 70 acres, raised by John Billing, Esq., and for which the premium was granted him in the year 1784.**

<table>
<thead>
<tr>
<th>Description</th>
<th>Expense (L.)</th>
<th>Expense (d.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ploughing on oat-fluffable in October 1783</td>
<td>49</td>
<td>0</td>
</tr>
<tr>
<td>Cross-ploughing in March 1784</td>
<td>1</td>
<td>4 0</td>
</tr>
<tr>
<td>Harrowing, 25. per acre</td>
<td>0</td>
<td>12 0</td>
</tr>
<tr>
<td>180 cart-loads of compost, 21. per acre</td>
<td>18</td>
<td>0 0</td>
</tr>
<tr>
<td>42 facks of feed-potatoes (each fack weighing 240 lb.) of the white sort</td>
<td>10</td>
<td>0 0</td>
</tr>
<tr>
<td>Cutting the facks, 6d. per fack</td>
<td>1</td>
<td>0 0</td>
</tr>
<tr>
<td>Setting on ridges eight feet wide (leaving an interval of two feet for an alley) 6d. for every 20 yards</td>
<td>10</td>
<td>0 0</td>
</tr>
<tr>
<td>Hoeing, at 5s. per acre</td>
<td>1</td>
<td>0 0</td>
</tr>
<tr>
<td>Digging up the two feet interval, and throwing the earth on the plants, at 10s. per acre</td>
<td>0</td>
<td>0 0</td>
</tr>
<tr>
<td>Digging up the crop, at 8d. for every 20 yards in length, the breadth being 8 feet</td>
<td>14</td>
<td>0 0</td>
</tr>
<tr>
<td>Labour and expense of securing in pits, wear and tear of baskets, straw, reed, &amp;c. 10s. per acre</td>
<td>3</td>
<td>0 0</td>
</tr>
<tr>
<td>Rent</td>
<td>0</td>
<td>0 0</td>
</tr>
<tr>
<td>Tithe</td>
<td>0</td>
<td>0 0</td>
</tr>
<tr>
<td>Profit</td>
<td>72</td>
<td>0 0</td>
</tr>
</tbody>
</table>

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**L. 146 0 0**

P 0
As potatoes are a comfortable food for the poor people, the field on which the above experiment was made, was an oat-bubble in the autumn of 1785. In October it was ploughed, and left in a rough state during the winter. In April it was cross-ploughed and harrowed. On the 8th of May the field was marked out into beds or ridges eight feet wide, leaving a space of two feet wide for an alley between every two ridges. The manure (a compost of stable dung, virgin earth, and scrapings of a turnpike road) was then brought on the land, and deposited in small heaps on the centre of each ridge, in the proportion of about 30 cart-loads to each acre. A trench was then opened with a spade breadth-way of the ridge; about four inches deep; in this trench the potato-sets were placed, at the distance of four inches from each other. The dung was then spread in a trench on the sets, and a space or slit of 14 inches in breadth, dug in upon them. When the plants were about six inches high, they were carefully hoed, and soon after the two feet intervals between the ridges were dug, and the contents thrown around the young plants. This refreshment, added to the ample manuring previously bestowed, produced such a luxuriance and rapidity of growth, that no weed could show its head.

The shortest and most certain method of taking up potatoes, is to plough once round every row at the distance of four inches, removing the earth from the plants, and gathering up with the hand all the potatoes that appear. The distance is made four inches, to prevent cutting the roots, which are seldom found above that distance from the row on each side. When the ground is thus cleared by the plough, raise the potatoes with a fork having three broad toes or claws; which is better than a spade, as it does not cut the potatoes. The potatoes thus laid above ground must be gathered with the hand. By this method scarce a potato will be left.

Bett method of taking them up.

Of preferring them.

Potatoes are a comfortable food for the poor people, it is of importance to have them all the year round. For a long time, potatoes in Scotland were confined to the kitchen-garden; and after they were planted in the field, it was not imagined at first that they could be used after the month of December. In late years they have been found to answer even till April, which has proved a great support to many a poor family, as they are easily cooked, and require neither kiln nor mill. But there is no cause for stopping there. It is easy to preserve them till the next crop: When taken out of the ground, lay in the corner of a barn a quantity that may serve till April, covered from frost with dry straw presed down: bury the remainder in a hole dug in dry ground, mixed with the husks of dried oats, rye, or the dry leaves of trees, over which build a stack of hay or corn. When the pit is opened for taking out the potatoes, the eyes of what have a tendency to push must be cut out; and this cargo will serve all the month of June. To be fill more certain of making the old crop meet the new, the setting of a small quantity may be delayed till June, to be taken up at the ordinary time before frost. This cargo, having not arrived to full growth, will not be so ready to push as what are set in April.

If the old crop happen before the new crop is ready, the interval may be supplied by the potatoes of the new crop that lie next the surface, to be picked up with the hand; which, far from hurting the crop, will rather improve it.

3. Carrot and Parsnip.

Of all roots, a carrot requires the deepest soil. It Culture of carrot.

The ground must be prepared by the deepest furrow that can be taken, the sooner after harvest the better; immediately upon the back of which, a ribbing ought to succeed, as directed for barley. At the end of March, or beginning of April, which is the time for fowing the seed, the ground must be smoothed with a rake. sow the seed in drills, with intervals of a foot for hand-hoeing; which is an expensive operation where the crop is confined to an acre or two; but if the quantity of ground be greater, the intervals ought to be three feet, in order for horse-hoeing.

In flat ground without ridges, it may be proper to make parallel furrows with the plough; ten feet from each other, in order to carry off any redundant moisture.

At Parlington in Yorkshire, from the end of September to the first of May, 23 work-horses, four bullocks, and six milk-cows, were fed on the carrots that grew on three acres; and these animals never tasted any other food but a little hay. The milk was excellent; and, over and above, 50 hogs were fattened upon what was left by the other beasts. We have this fact from unoubted authority.

The culture of parsnips is the same with that of parsnips.

III. Plants cultivated for Leaves, or for both Leaves and Root.

There are many garden-plants of these kinds. The plants proper for the field are cabbage, red and white colewort plain and curled, turnip-rooted cabbage, and the root of scurd, or red cabbage.

Cabbage is an interesting article of husbandry. It is easily raised, is subject to few diseases, refits frost more than turnip, is palatable to cattle, and sooner fills them than turnip, carrot, or potatoes.

The season for setting cabbage depends on the use Culture of it is intended for. If intended for feeding in November, December, and January, plants procured from feed down the end of July the preceding year must be set in March or April. If intended for feeding in March, April, and May, the plants must be set the first week.
Agriculture.

Practice.

Part II.

Week of the preceding July, from seed sown in the end of February or beginning of March the same year. The late setting of the plants retards their growth; by which means they have a vigorous growth the following spring. And this crop makes an important link in the chain that connects winter and summer green food. Where cabbage for spring-food happens to be supplied the want. After the rye is consumed, there is time sufficient to prepare the ground for turnips.

And now to prepare a field for cabbage. Where the plants are to be set in March, the field must be made up after harvest, in ridges three feet wide. In that form let it lie all winter, to be mellowed with air and frost. In March, take the first opportunity, between wet and dry, to lay dung in the furrows. Cover the dung with a plough, which will convert the furrow into a crown, and consequently the crown into a furrow.

Set the plants upon the dung, distant from each other three feet. Plant them so as to make a straight line across the ridges, as well as along the furrows, to which a gardener's line (stretched perpendicularly across the furrows will be requisite. This will set each plant at the distance precisely of three feet from the plants that surround it. The purpose of this accuracy is to give opportunity for ploughing, not only along the ridges, but across them. This mode is attended with three signal advantages: it saves hand-hoeing, it is a more complete dressing to the soil, and it lays earth nearly round every plant.

If the soil be deep and composed of good earth, a trench ploughing after the preceding crop will not be amiss; in which case, the time for dividing the field into three-feet ridges, as above, ought to be immediately before the dunging for the plants.

If weeds happen to rise so close to the plants as not to be reached by the plough, it will require very little labour to destroy them with a hand-hoe.

Unless the soil be much infested with annuals, twice ploughing after the plants are set will be a sufficient dressing. The first removes the earth from the plants; the next, at the distance of a month or so, lays it back. Where the plants are to be set in July, the field must be ribbed as directed for barley. It ought to have a flight ploughing in June before the planting, in order to loosen the soil, but not so as to bury the surface-earth; after which the three-feet ridges must be formed, and the other particulars carried all as above with this soil. Which a gardener's line must be ribbed as to make a straight line, and three feet as well as along the furrows, to which a gardener's line (stretched perpendicularly across the furrows must be requisite. This will set each plant at the distance precisely of three feet from the plants that surround it. The purpose of this accuracy is to give opportunity for ploughing, not only along the ridges, but across them. This mode is attended with three signal advantages: it saves hand-hoeing, it is a more complete dressing to the soil, and it lays earth nearly round every plant.

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2. As to the turnip-rooted cabbages, their importance and value seem only to have been lately ascertained. In the Bath Society Papers we have the following account of Sir Thomas Beevor's method of cultivating them; which from experience he found to be cheaper and better than any other.

"In the first or second week of June, I sow the same quantity of seed, hoe the plants at the same size, leave them at the same distance from each other, and treat them in all respects like the common turnip. In this method I have always obtained a plentiful crop of them; to ascertain the value of which I need only inform you, that on the 23rd day of April last, having two acres left of my crop, found, and in great perfection, I divided them by fold hurdles into three parts of nearly equal dimensions. Into the first part I put 24 small bullocks of about 30 stone weight each (140 to the stone), and 30 middle-sized fat wethers, which, at the end of the fifth week, after they had ty and va­

eaten down the greater part of the leaves, and some part of the roots, I shifted into the second division, and then put 70 lean sheep into what was left of the first; these fed off the remainder of the turnips left by the fat stock, and so they were shifted through the three divisions, the lean flock following the fat as they wanted food, until the whole was consumed.

"The 24 bullocks and 30 fat wethers continued in the turnips until the 21st of May, being exactly four weeks; and the 70 lean sheep until the 29th, which is one day over four weeks; so that the two acres kept my 24 small bullocks and 110 sheep four weeks (not reckoning the overplus day of keeping the lean sheep); the value, at the rate of keeping at that feast, cannot be ascertained in any common year at left that 44. a week for each sheep, and 15. 6d. per week for each bullock, which would amount together to the sum of £ 14: 10: 8: for the two acres.

"You will hardly, I conceive, think I have set the price of keeping the stock at two high a rate; it is beneath the price here in almost every spring, and in this lat it would have cost double, could it have been procured; which was so far from being the case, that hundreds of sheep and lambs were sent, and the rest greatly pinch'd for want of food.

"You will observe, gentlemen, that in the valuation of the crop abovementioned I have claimed no allowance for the great benefit the farmer receives by being enabled to suffer his grass to get into a forward growth, nor for the superior quality of these turnips in fattening his stock; both which circumstances must stamp new and a great additional value upon them. But as their continuance on the land may seem to be injurious to the succeeding crop, and indeed will deprive the farmer totally of either oats or barley; so to supply that loss I have always sown buck-wheat on the land from which the turnips were left by the fat stock; and so I shifted, I sowed my clover or other grass seeds with the buck-wheat, in the same manner as with the oat or barley crops.

"Thus you see, that in providing a most incomparable vegetable food for cattle, in that season of the year in which the farmer is generally most in diftress, and his cattle almost starved, a considerable profit may be obtained, much beyond what is usually derived from his former practice, by the great produce and price of a crop raised at so easy an expense as that of buckwheat, which, with us, sells commonly at the same price as barley, and on times more, and but very rarely for less.

"The land on which I have usually sown turnip-rooted cabbages is a dry mixed soil, worth 15s. per acre.

To the preceding account the Society have subjoined the following note: "Whether we regard the importance
Agriculture.

Practise.

Recommendation by the Bath Agricultural Society. To raise the land intended for the plantation of the root of turnip, it may be necessary to judge as much old manure as may be necessary for the feed-bed, as the roots are thick with plants which are sufficient to plant an acre. The land should be dug as shallow as possible, turning the ashes in, and the seed should be sown in the beginning of April.

The land intended for the plantation to be cultivated and dugged as for the common turnip. About Midsummer (or sooner if the weather will permit) will be a proper time for planting, which is best done in the following manner: the land to be broken into one boat ridges, upon the tops of which the seed are to be set, at about 18 inches distance from each other. As soon as the weeds rise, give a hand-hoeing, afterwards run the ploughs in the intervals, and fetch a furrow from each ridge, which, after laying a fortnight or three weeks, is again thrown back to the ridges; if the weeds rise again, it is necessary to give them another hand-hoeing. If the young plants in the seed-bed should be attacked by the fly, few wood ashes over them when the dew is on, which will effectually prevent the ravages they would otherwise make.

To raise the turnip-rooted cabbage for transplanting, the best method yet discovered is, to breast-plough and burn as much old manure as may be judged necessary for the feed-bed, two perches well finkèd with plants which are sufficient to plant an acre. The land should be dug as shallow as possible, turning the ashes in, and the seed should be sown in the beginning of April.

The land intended for the plantation to be cultivated and dugged as for the common turnip. About Midsummer (or sooner if the weather will permit) will be a proper time for planting, which is best done in the following manner: the land to be broken into one boat ridges, upon the tops of which the plants are to be set, at about 18 inches distance from each other. As soon as the weeds rise, give a hand-hoeing, afterwards run the ploughs in the intervals, and fetch a furrow from each ridge, which, after laying a fortnight or three weeks, is again thrown back to the ridges; if the weeds rise again, it is necessary to give them another hand-hoeing. If the young plants in the seed-bed should be attacked by the fly, few wood ashes over them when the dew is on, which will effectually prevent the ravages they would otherwise make.

The culture of the root of scarcity. The racion de deficit, or root of scarcity, (Beta cicla) delights in a rich loamy land well dugged. It is directed to be sown in rows, or broad-cast, and as soon as the plants are of the size of a goose-quill, to be transplanted in rows of 18 inches distance, and 18 inches a part, one plant from the other: care must be taken in the sowing, to sow very thin, and to cover the seed, which lays in the ground about a month, an inch only. In transplanting, the root is not to be shortened, but the leaves cut at the top; the plant is then to be planted with a setting tick, so that the upper part of the root shall appear about half an inch out of the ground; this last precaution is very necessary to be attended to. These plants will strike root in twenty-four hours, and a man a little accustomed to planting, will plant with ease 1800 or 2000 a-day. In the feed-bed, the plants, like all others must be kept clear of weeds: when they are planted out, after once hoeing, they will take care of themselves, and succour every kind of weed near them.

The best time to sow the feed is from the beginning of March to the middle of April: it is, however, advised to continue sowing every month until the beginning of July, in order to have a succession of plants. Both leaves and roots have been extolled as excellent both for man and beast. This plant is said not to be liable, like the turnip, to be destroyed by insects, for no insect touches it, nor is it affected by excessive drought, or the changes of seasons. Horned cattle, horses, pigs, and poultry, are exceedingly fond of it when cut small. The leaves may be gathered every 12 or 15 days; they are from 20 to 40 inches long, by 22 to 25 inches broad. This plant is excellent for milch cows, when given to them in proper proportions, as it adds much to the quality as well as quantity of their milk; but care must be taken to proportion the leaves with other green food, as otherwise it would adore the milk, and fatten them too much, it being of so exceeding fattening a quality. To put all these properties beyond doubt, however, further experiments are wanting.

 Sect. IV. Culture of Grasses. The latter end of August, or the beginning of September, is the best season for sowing grass-feeds, as down fields are cleared away on the roots of the young grass to fix them. If you would have fine pasture, never sow on foul ground. On the contrary, plough it well, and clear it from the roots of couch-grass, reed-harrow, fern, broom, and all other noxious weeds. If you are suffered to remain, you will soon get above, and destroy your young grass. Rake thech us in heaps, and burn them on the land, and spread the ashes as a manure. These ploughings and harrowings should be repeated in dry weather. And if the soil be clayey and wet, make some under-drains to carry off the water, which, if suffered to remain, will not only chill the grass, but make it four. Before sowing, lay the land as level and fine as possible. If your grass-feeds are clean, (which should always be the case) three bushels will be sufficient per acre. When sown, harrow it in gently, and roll it in with a wooden roller. When it comes up, fill up all the bare spots by fresh feed, which, if rolled to fix it, will soon come up, and overtake the rest.

In Norfolk they sow clover with their grasses, particularly with rye grass; but this should not be done except when the land is designed for grass only three or four years, because neither of these kinds will last long in the land. Where you intend it for a continuance, it is better to mix only small white Dutch clover, or marle grass, with your other grass feed, and not more than eight pounds to an acre. These are abiding plants, spread clofe on the surface, and make the sweetest feed of any for cattle. In the following spring, root up thistles, hemlock, or any large plants that appear. This is the best and easiest method of proceeding in laying down fields to grass is extremely injudicious. Some few barley with their grasses, which they suppose to be useful in finding them, without considering how much the corn draws away the nourishment from the land.

Others take their feeds from a four hay-ridge; by different kinds of which means, besides filling the land with rubbish and weeds, what they intend for dry foils may have come grasses from moif, where it grew naturally, and vice versa. The conclusion is, that the ground, instead of being covered with a thick sward, is filled with plants unnatural to it. The kinds of grass most eligible for pasture lands are, the annual-meadow, creeping, and fine bent, the fox-tails, and cobby dog's-tail, the poa, the fescues, the vernal, orch-grasses.
AGRICULTURE.

Part II.

The proper season for fowing red clover, is from the middle of April to the middle of May. It will spring from the first of March to the end of August; but such liberty ought not to be taken except from necessity.

There cannot be a greater blunder in husbandry, than to be sparing of feed. Ideal writers talk of fowing an acre with four pounds. That quantity of feed, say they, will fill an acre with plants as thick as they ought to stand. This rule may be admitted where grain is the object; but it will not answer with respect to grass. Grass-feed cannot be fown too thick: the plants shelter one another; they retain all the dew; and they must push upwards, having no room laterally. Observe the place where a check of pease, or of other grain, has been set down for fowing: the seed drop there accidentally grows more quickly than in the rest of the field fown thin out of hand. A young plant of clover, or of fain-foin, according to Tull, may be raised to a great size where it has room; but the field will not produce half the quantity. When red clover is fown for cutting green, there ought not to be less than 24 pounds to an acre. A field of clover is seldom too thick; the smaller a stem be, the more acceptable it is to cattle. It is often too thin; and when fo, the stems tend to wood.

Red clover is commonly sown with grain; and the most proper grain has been found by experience to be clover with flax. The foil must be highly cultivated for flax as well as for red clover. The proper season for fowing is the same for both; the leaves of flax being very small, admit of free circulation of air; and flax being an early crop, is removed so early as to give the clover time for growing. In a rich soil it has grown to fall, as to afford a good cutting that very year. Next to flax, barley is the best companion to clover. The foil must be loose and free for barley; and so it ought to be for clover: the season of fowing is the same; and the clover is well established in the ground, before it is overtopped by the barley. At the same time, barley commonly is sooner cut than either oats or wheat. In a word, barley is rather a nurse than a stepmother to clover during its infancy. When clover is fown in spring upon wheat, the foil, which has lain five or six months without being stirred, is an improper bed for it; and the wheat, being in the vigour of growth, overtops it from the beginning. It cannot be fown along with oats, because of the hazard of frost; and when fown as usual among the oats three inches high, it is over-topped, and never enjoys free air till the oats be cut. Add, that where oats are sown upon the winter furrow, the foil is rendered as hard as when under wheat.—Red clover is sometimes sown by itself without other grain: but this method, beside losing a crop, is not salutary; because clover in its infant state requires shelter.

As to the quantity of grain proper to be sown with clover: In a rich foil well pulverized, a peck of barley on an English acre is all that ought to be ventured. Two Linlithgow firlets make the proper quantity for an acre that produces commonly 30 bushels of barley, half a firlet for what produces nine bolls. To those who are governed by custom, so small a quantity will be thought ridiculous. Let them only consider, that a rich ffoil in perfect good order, will with a single feed of

grafs, and the ray, or rye-grafs. We do not, however, approve of fowing all these kinds together; for not to mention their ripening at different times, by which means you can never cut them all in perfection and full vigour, no kind of cattle are fond of all a-like.

Horses will scarcely eat hay which oxen and cows will thrive upon; sheep are particularly fond of some kinds, and refuse others. The Darnel-grafs, if not cut before several of the other kinds are ripe, becomes so hard and wiry in the flanks, that few cattle care to eat it.

Such gentlemen as with a particular account of the abovementioned grasses, will be amply gratified in consulting Mr. Stillingsfeet on this subject. He has treated it with great judgment and accuracy, and those who follow his directions in the choice of their grasses will be under no small obligation to him for the valuable information he has given them. The substance of his observations are given in the article Grasses in this Dictionary.

The grasses commonly fown for pasture, for hay, or to cut green for cattle, are red clover, white clover, yellow clover, rye-grafs, narrow-leaved plantain commonly called ribwort, fain foin, and lucerne.

Red clover is of all the most proper to be cut green for summer-food. It is a biennial plant when fuffered to perfect its seed; but when cut green, it will last three years, and in a dry foil longer. At the same time the safest course is to let it stand but a single year: if the second year's crop happen to be scanty, it proves, like a bad crop of pease, a great encourager of weeds by the shelter it affords them.

Here, as in all other crops, the goodness of feed is of importance. Choose plump feed of a purple colour, because it takes on that colour when ripe. It is red when hurt in the drying, and of a faint colour when ripe.

Red clover is luxuriant upon a rich foil, whether clay, loam, or gravel; it will grow even upon a moor, when properly cultivated. A wet foil is its only bane; for there it does not thrive.

To have red clover in perfection, weeds must be extirpated, and stones taken off. The mould ought to be made as fine as harrowing can make it; and the surface be smoothed with a light roller, if not sufficiently smooth without it. This gives opportunity for distributing the feed evenly, which must be covered by a small harrow with teeth no larger than that of a garden rake, three inches long, and six inches asunder. In harrowing, the man should walk behind with a rope in his hand fixed to the back part of the harrow, ready to difentangle it from stones, clods, turnip or cabbagereeds, which would trail the feed, and displace it.

Nature has not determined any precise depth for the feed of red clover more than for other feed. It will grow vigorously from two inches deep, and it will grow when barely covered. Half an inch may be reckoned the most advantageous position in clay soil, a whole inch in what is light or loofe. It is a vulgar error, that small feed ought to be sparingly covered. Milled by the error, farmers commonly cover their clover-fed with a bulky branch of thorn; which not only covers it unequally, but leaves part on the surface to wither in the air.

Plate V. fig. 7.

Of red clover.
Part II. AGRICULTURE.

White and yellow clover, ribwort, rye-grass, of barley produce 20 or 30 vigorous stems. People may litter themselves with the remedy of cutting barley green for feed, if it happens to oppress the clover. This is an excellent remedy in a field of an acre or two; but the cutting an extensive field for food must be slow; and while one part is cutting, the clover is smothered in other parts.

The culture of white clover, of yellow clover, of ribwort, of rye-grass, is the fame in general with that of red clover. We proceed to their peculiarities. Yellow clover, ribwort, rye-grass, are all of them early plants, blooming in the end of April or beginning of May. The two latter are evergreens, and therefore excellent for winter pasture. Rye-grass is left by frost than any of the clovers, and will thrive in a moist soil: nor in that soil is it much affected by drought. In a rich soil, it grows four feet high; even in the dry summer 1775; it rose to three feet eight inches; but it had gained that height before the drought came on. These grasses are generally fown with red clover for producing a plentiful crop. The proportion of feed is arbitrary; and there is little danger of too much. When rye-grass is fown for procuring feed, five firlots wheat-measure may be fown on an acre; and for procuring feed of ribwort, 40 pounds may be fown.

The roots of rye-grass spread horizontally: they bind the foil by their number; and the small, are yet vigorous as to thrive in hard soil. Red clover has a large tap-root, which cannot penetrate any foil but what is open and free; and the largeness of the root makes the foil fill more open and free. Rye-grass, once a great favourite, appears to be discarded in most parts of Britain. The common practice has been, to sow it with red clover, and to cut them promiscuously the beginning of June for green feed, and a little later for hay. This indeed is the proper season for cutting red clover, because at that time it begins to flower; but as at that time the feed of the rye-grass is approaching to maturity, its growth is stopped for that year, as much as of oats or barley cut after the feed is ripe. Oats or barley cut green before the feed forms, will afford two other feedings, as to thrive in hard soil. Red clover has a large tap-root, which cannot penetrate any soil but what is open and free; and the largeness of the root makes the soil fill more open and free. Rye-grass, once a great favourite, appears to be discarded in most parts of Britain. The common practice has been, to sow it with red clover, and to cut them promiscuously the beginning of June for green feed, and a little later for hay. This indeed is the proper season for cutting red clover, because at that time it begins to flower; but as at that time the feed of the rye-grass is approaching to maturity, its growth is stopped for that year, as much as of oats or barley cut after the feed is ripe. Oats or barley cut green before the feed forms, will afford two other cuttings; which is the cafe of rye-grass, of yellow clover and of ribwort. By such management, all the profit will be drawn that these plants can afford.

When red clover is intended for feed, the ground ought to be cleared of weeds, were it for no other purpose than that the feed cannot other wise be preferred pure: what feeds escape the plough ought to be taken out by the hand. In England, when a crop of feed is intended, the clover is always first cut for hay. This appears to be done, as in fruit-trees, to check the growth of the wood, in order to encourage the fruit. This practice will not answer in Scotland, as the feed would often be too late for ripening. It would do better to eat the clover with sheep till the middle of May, which would allow the feed to ripen. The feed is ripe when, upon rubbing it between the hands, it parts readily from the husk. Then apply the feth, spread the crop thin, and turn it carefully. When perfectly dry, take the first opportunity of a hot day for threshing it on boards covered with a coarse sheet. Another way is subject to risk, is to stack the dry hay, and to thresh it in the end of April. After the first threshing, expose the husks to the sun, and thresh them over and over till no feed remain. Nothing is more efficacious than a hot sun to make the hulks part with its feed; in which view it may be expected to the feed by parcels, an hour or two before the stack is applied.

White clover intended for feed, is managed in the same manner. No plant ought to be mixed with rye-grass that is intended for feed. In Scotland, much rye-grass feed is hurt by transplanting that rule. The feed is ripe when parts easily with the husks. The yellow roots of the stem is an her indication of its ripeness; in which particular it resembles oats, barley, and other culmiferous plants. The best manner to manage a crop of rye-grass for feed, is to bind it loosely in small sheaves, widening them at the bottom to make them stand erect; as is done with oats in moist weather. In that state they may stand till sufficiently dry for threshing. By this method they dry more quickly, and are less hurt by rain, than by close binding and putting the sheaves in chocks like corn. The worst way of all is to spread the rye-grass on the moist ground, for it makes the feed malten. The sheaves, when sufficiently dry, are carried in close carts to where they are to be threshed on a board, as mentioned above for clover. Put the straw into a rick when a hundred stone or more are threshed. Carry the threshing-board to the place where another rick is intended; and let on till the whole feed be threshed, and the straw ricked. There is necessity for close carts to save the feed, which is apt to drop out in a hot sun; and, as observed above a hot sun ought always to be chosen for threshing. Carry the feed in sacks to the granary or barn, there to be separated from the husks by a fanner. Spread the feed thin upon a timber-floor, and turn it once or twice a day till perfectly dry. If suffered to take a heat, it is useless for feed.

The writers on agriculture reckon fainfoin preferable to clover in many respects: They say, that it produces a larger crop; that it does not hurt cattle when eaten green; that it makes better hay; that it continues four times longer in the ground; and that it will grow on land that will bear no other crop. Sainfoin has a very long tap-root, which is able to pierce very hard earth. The roots grow very large; and the larger they are, they penetrate to the greater depth; and hence it may be concluded, that this grass, when it grows well, receives a great part of its nourishment from below the scape of the foil: of course, a deep dry soil is best for the culture of fainfoin. When plants draw their nourishment from that part of the soil that is near the surface, it is not of much consequence whether their number be great or small. But the case is very different when the plants receive their food not only near, but also deep below, the surface. Besides, plants that shoot their roots deep are often supplied with moisture, when those near the surface are parched with drought.

To render the plants of fainfoin vigorous, it is necessary that they be sown thin. The best method of doing this is by a drill; because, when sown in this manner, not only the weeds, but also the supernumerary plants, can easily be removed. It is several years before fainfoin comes to its fullest strength; and the number of plants sufficient to flock a field, while in this imperfect rate, will make but a poor crop for the first year or two. It is therefore necessary that it be sown in such a manner as to make it easy to take up plants...
in such numbers, and in such order, as always to leave in the field the proper number in their proper places. This can only be done, with propriety, by fowing the plants in rows by a drill. Supposing a field to be drilled in rows at ten inches distance, the partitions may be hand-hoed, and the rows dressed in such a manner as to leave a proper number of plants. In this situation the field may remain two years; then one-fourth of the rows may be taken out in pairs, in such a manner as to make the beds of fifty inches, with six rows in each, and intervals of thirty inches, which may be ploughed. Next year, another fourth of the rows should be hand-hoed, and the rows drilled in such a manner as to make the beds of fifty inches, with six rows in each, and intervals of thirty inches. All of which may be hoed at once or alternately, as it may be found most convenient.

The great quantity of this grass which the writer on this subject assures us may be raised upon an acre, and the excellence and great value of the hay made of it, should induce farmers to make a complete trial of it, and even to use the spade in place of the hoe, or hoe-plough, if necessary.

The plants taken up from up a field of sainfoin may be set in another field; and if the transplanting of this grass succeeds as well as the transplanting of lucerne has done with Mr. Lunin de Chateauvieux, the trouble and expense will be sufficiently recompensed by the largeness of the crops. In transplanting, it is necessary to cut off great part of the long tap-root; this will prevent it from striking very deep into the soil, and make it pull out large roots in a sloping direction from the cut end of the tap-root. Sainfoin managed in this manner, will thrive even on shallow land that has a wet bottom, provided it be not overstocked with plants.

Whoever inclines to try the culture of this grass should take great pains in preparing the land, and making it as free from weeds as possible.

In England, as the roots strike deep in that chalky soil, this plant is not liable to be so much injured by drought as other grasses are, whose fibres lie horizontally, and lie near the surface. The quantity of hay produced is greater and better in quality than any other. But there is one advantage attending this grass, which renders it superior to any other; and that arises from feeding with it. The prodigious increase of milk which it makes is astonishing, being nearly double that produced by any other green food. The milk is also better, and yields more cream than any other; and the butter procured from it is better coloured and flavoured.

The following remarks by an English farmer are made from much experience and observation.

Sainfoin is much cultivated in those parts where the soil is of a chalky kind. It will always succeed well where the roots run deep; the white soil of all for it is where there is a bed of cold wet clay, which the render fibres cannot penetrate. This plant will make a greater increase of produce, by at least 50 times, than common grass or turf upon poor land. Where it meets with chalk or stone, it will extend its roots through the cracks and chinks to a very great depth in search of nourishment. The dryness of more consequence than the richness of land for sainfoin; although land that is both dry and rich will always produce the largest crops.

It is very commonly sowed broadcast; but it is found to answer best in drills, especially if the land be made fine by repeatedly ploughing, rolling, and harrowing. Much depends on the depth which this grass is sown. If it be sown more than an inch deep, it will fail to grow; and if it be sown shallow, it will pull out its roots above ground, and there will be killed by the air. March and the beginning of April are the best seasons for sowing it, as the severity of winter and the drought of summer are equally unfavourable to the young plants. A bushel of seed sown broadcast, or half that quantity in drills, if good, is sufficient for an acre. The drills should be 30 inches apart, to admit of horse-hoeing between them. Much, however, depends on the goodness of the seed, which may be best judged of by the following marks.

The hulk being of a bright colour, the kernel plump, of a grey or bluish colour without, and, if cut across, greenish and fresh within; if it be thin and floury, and of a yellowish cast, it will seldom grow. When the plants stand single, and have room to spread, they produce the greatest quantity of pasture, and the feed ripens best. But farmers in general, from a mistaken notion of all that appears to be waste ground being unprofitable, plant them close, that they choke and impoverish each other, and often die in a few years. Single plants will often produce half a pound of hay, when dry. On rich land this plant will yield two good crops in a year, with a moderate share of culture. A good crop must not be expected the first year; but, if the plants stand not too thick, they will increase in size the second year prodigiously.

No cattle should be turned on the field the first winter after the corn is off with which it is sown, as their feet would injure the young plants. Sheep should not come on the following summer, because they would bite off the crown of the plants, and prevent their blooming again. A small quantity of foapers sashes as a top-dressing will be of great service, if laid on the first winter.

If the sainfoin be cut just before it comes into bloom, it is admirable food for horned cattle; and if cut thus early, it will yield a second crop the same season. But if it proves a wet season, it is better to let it stand till its bloom be perfect; for great care must be taken, in making it into hay, that the flowers do not drop off, as cows are very fond of them; and it requires more time than other hay in drying. Sainfoin is so excellent a fodder for horses, that they require no oats while they eat it, although they be worked hard all the time. Sheep will also be fattened with it faster than with any other food.

If the whole season for cutting proves very rainy, it is better to let the crop stand for feed, as that will amply repay the loss of the hay; because it will not only fetch a good price, but a peck of it will go as far as a peck and a half of oats for horses.

The best time of cutting the seeded sainfoin is when the greatest part of the seed is well filled, the first
Part II.  

AGRICULTURE.  

Practice.  

blown ripe, and the last blown beginning to open. For want of this care some people have lost most of their feed by letting it stand too ripe. Seeded fainfoin should always be cut in a morning or evening, when the dew renders the stalks tender. If cut when the sun shines hot, much of the feed will fall out and be lost.

An acre of very ordinary land, when improved by this grass, will maintain four cows very well from the first of April to the end of November; and afford, besides, a sufficient store of hay to make the greater part of their feed the four months following.

If the soil be tolerably good, a field of fainfoin will last from 15 to 20 years in prime; but at the end of seven or eight years, it will be necessary to lay on a moderate coat of well-rotted dung; or, if the soil be very light and sandy, of marle. By this means the future crops, and the duration of the plants in health and vigour, will be greatly increased and prolonged. Hence it will appear, that for poor land there is nothing equal to this grass in point of advantage to the farmer.

Clover will last only two years in perfection; and often, if the soil be cold and moist, near half the plants will rot, and bald patches be found in every part of the field the second year. Besides, from our frequent rains during the month of September, many crops left for feeding are lost. But from the quantity and excellent quality of this grass (fainfoin), and its ripening earlier, and continuing in vigour so much longer, much rick and certain expense is avoided, and a large annual profit accrues to the farmer.

The writers on agriculture, ancient as well as modern, below the highest encomiums upon lucerne as affording excellent hay, and producing very large crops. Lucerne remains at least 10 or 12 years in the ground, and produces about eight tons of hay upon the Scots acre. There is but little of it cultivated in Scotland. However, it has been tried in several parts of that country; and it is found, that, when the feed is good, it comes up very well, and stands the winter frost. But the chief thing that prevents this grass from being more used in Scotland, is the difficulty of keeping the soil open and free from weeds. In a few years the surface becomes so hard, and the turf so strong, that it destroys the lucerne before the plants have arrived at their greatest perfection: so that lucerne can scarce be cultivated with success there, unless some method be fallen upon of destroying the natural grass, and prevent the surface from becoming hard and impenetrable. This cannot be done effectually by any other means than horse-hoeing. This method was first proposed by Mr. Tull, and afterwards practiced successfully by M. de Chateauneuf near Geneva. It may be of use therefore to give a view of that gentleman's method of cultivating lucerne.

He does not mention any thing particular as to the manner of preparing the land; but only observes in general, that no pains should be spared in preparing it. He tried the fowing of lucerne both in rows upon the beds where it was intended to stand, and likewise the fowing it in a nursery, and afterwards transplanting it into the beds prepared for it. He prefers transplanting; because, when transplanted, part of the tap-root is cut off, and the plant floors out a number of lateral branches from the cut part of the root, which makes it spread its roots nearer the surface, and consequently renders it more easily cultivated; besides this circumstance adapts it to a shallow soil, in which, if left in its natural state, it would not grow.

The transplanting of lucerne is attended with many advantages. The land may be prepared in the summer for receiving the plants from the nursery in autumn; by which means the field must be in a much better situation than if the feed had been fown upon it in the spring. By transplanting, the rows can be made more regular, and the intended distance more exactly observed; and consequently the hoeing can be performed more perfectly, and with less expense. Mr. Chateauneuf likewise tried the lucerne in single beds three feet wide, with single rows; in beds three feet nine inches wide, with double rows; and in beds four feet three inches wide, with triple rows. The plants in the single rows were four inches asunder, and those in the double and triple rows were about eight or nine inches. In a course of three years he found, that a single row produced more than a triple row of the same length. The plants of lucerne, when cultivated by transplanting, should be at least six inches asunder, to allow them room for extending their crowns.

He further observes, that the beds or ridges ought to be raised in the middle; that a small trench, two or three inches deep, should be drawn in the middle; and that the plants ought to be set in it in the spring, and in a warm soil, covered with earth up to the neck. He says, that if the lucerne be fown in the spring, and in a warm soil, it will be ready for transplanting in September; that, if the weather be too hot and dry, the transplanting should be delayed till October; and that, if the weather be unfavourable during both these months, this operation must be delayed till spring. He further directs, that the plants should be carefully taken out of the nursery, so as not to damage the roots; that the roots be left only about six or seven inches long: that the green crops be cut off within about two inches of the crown; that they be put into water at noon, or as soon as taken up, there to remain till they are planted, and that they should be planted with a planting-stick, in the same manner as cabbages.

He does not give particular directions as to the times of horse-hoeing; but only lays in general, that the intervals should be stirred once in the month during the whole time that the lucerne is in a growing state. He likewise observes, that great care ought to be taken not to suffer any weeds to grow among the plants, at least for the first two or three years; and for this purpose, that the rows, as well as the edges of the intervals where the plough cannot go, should be weeded by the hand.

Burnet is peculiarly adapted to poor land; besides, it proves an excellent winter-pasture, when hardly any thing else vegetates. Other advantages are, it makes good butter; it never blows or sweats cattle; it is fine pasture for sheep; and will flourish well on poor, light, sandy, or stony soils, or even on dry chalk hills.

The cultivation of it is neither hazardous nor expensive.
If the land is prepared as is generally done for turnips, there is no danger of its failing. After the first year, it will be attended with very little expense, as the flat circular spread of its leaves will keep down, or prevent the growth of weeds.

On the failure of turnips, either from the fly or the black worm, some of our farmers have sown the land with burnet, and in March following had a fine pasturage for their sheep and lambs. It will perfect its seed twice in a summer; and this seed is said to be as good as oats for horses; but it is too valuable to be applied to that use.

It is sometimes sown late in the spring with oats and barley, and succeeds very well; but it is best to sow it finely in the beginning of July, when there is a prospect of rain, on a small piece of land, and in October following, transplant it in rows two feet apart, and about a foot distant in the rows. This is a proper distance, and gives opportunity for hoeing the intervals in the succeeding spring and summer.

After it is fed down with cattle, it should be harrowed clean. Some horses will not eat it freely at first, but in two or three days they are generally very fond of it. It affords rich pleasant milk, and in great plenty.

A gentleman farmer near Maidstone some years since sowed four acres as soon as the crop of oats was got off, which was the latter end of August. He threw in 32 tons of seed per acre, broadcast; and no rain falling until the middle of September, the plants did not appear before the latter end of that month. There was however a good crop, and in the spring he let the plants out with a turnip-hoe, leaving them about a foot distant from each other. But the drill method is preferable, as it saves more than half the feed. The land was a poor dry gravel, not worth three shillings an acre for any thing else.

The severed root never injures this plant: and the oftener it is fed the thicker are its leaves, which spring constantly from its root.

No branch of husbandry requires more skill and sagacity than a proper rotation of crops, as to keep the ground always in heart, and yet to draw out of it the greatest profit possible. Some plants rob the soil, others are gentle to it: some bind, others loosen. The nice point is, to intermix crops, so as to make the greatest profit consistently with keeping the ground in trim. In that view, the nature of the plants employed in husbandry must be accurately examined.

The difference between culmiferous and leguminous plants, is occasionally mentioned above. With respect to the present subject, a closer inspection is necessary. Culmiferous plants, having small leaves and few in number, depend mostly on the soil for nourishment, and little on the air. During the ripening of the feed, they draw probably their whole nourishment from the soil; as the leaves by this time, being dry and withered, must have loft their power of drawing nourishment from the air. Now, as culmiferous plants are chiefly cultivated for their feed, and are not cut down till the seed be fully ripe, they may be pronounced all of them to be robbers, some more, some less. But such plants, while young, are all leaves; and in that state draw most of their nourishment from the air. Hence it is, where that green for food to cattle, a culmiferous crop is far from being a robber. A hay-crop accordingly, even where it confists mostly of rye-grass, is not a robber, provided it be cut before the feed is formed; which at any rate it ought to be, if one would have hay in perfection. And the foggage, excluding the frost by covering the ground, keeps the roots warm. A leguminous plant, by its broad leaves, draws much of its nourishment from the air. A cabbage, which has very broad leaves, and a multitude of them, owes its growth more to the air than to the soil. One fact is certain, that a cabbage cut and hung up in a damp place, prefers its verdure longer than other plants.

At the same time, a feed is that part of a plant which requires the most nourishment: and for that nourishment a culmiferous plant must be indebted entirely to the soil. A leguminous crop, on the contrary, when cut green for food, must be very gentle to the ground. Peas and beans are leguminous plants; but being cultivated for seed, they seem to occupy a middle station: their feed makes them more severe than other leguminous crops cut green; their leaves, which grow till reaping, make them less severe than a culmiferous plant left to ripen.

These plants are distinguished, remarkably by the following circumstance. All the seeds of a culmiferous plant ripen at the same time. As soon as they begin to form, the plant becomes stationary, the leaves wither, the roots cease to push, and the plant when cut down is blanched and sapless. The seeds of a leguminous plant are formed successively: flowers and fruit appear at the same time in different parts of the plant. This plant accordingly is continually growing, and pushing its roots. Hence the value of bean or pea straw above that of wheat or oats: the latter is withered and dry when the crop is cut; the former, green and succulent. The difference therefore, with respect to the soil, between a culmiferous and leguminous crop, is great. The latter, growing till cut down, keeps the ground in constant motion, and leaves it the plough loose and mellow. The former gives over growing long before reaping; and the ground, by want of motion, turns compact and hard. Nor is this all. Dew falling on a culmiferous crop after the ground begins to harden, rests on the surface, and is sucked up by the next sun. Dew that falls on a leguminous crop, is shaded from the sun by the broad leaves, and sinks at leisure into the ground. The ground accordingly, after a culmiferous crop, is not only hard, but dry; after a leguminous crop, it is not only loofe, but soft and unechoes.

Of all culmiferous plants, wheat is the most severe, by the long time it occupies the ground without admitting a plough. And as the grain is heavier than that of barley or oats, it probably requires more nourishment than either. It is observed above, that as peas and beans draw part of their nourishment from the air by their green leaves while allowed to stand, they draw the lefs from the ground; and by their constant growing they leave it in good condition for subsequent crops. In both respects they are preferable to any culmiferous crop.

Culmiferous crops, as observed above, are not robbers when cut green: the soil, far from hardening, is kept...
Part II. AGRICULTURE.

Practic. kept in constant motion by the pulling of the roots, and is left more tender than if it had been left at rest without any bearing crop.

Bulbous-rooted plants are above all successful in dividing and pulverizing the soil. Potato-roots grow six, eight, or ten inches under the surface; and, by their size and number, they divide and pulverize the soil better than can be done by the plough; consequently, whatever be the natural colour of the soil, it is black when a potato-crop is taken up. The potato, however, with respect to its quality of dividing the soil, must yield to a carrot or parsnip; which are large roots, and pierce often to the depth of 18 inches. The turnip, by its tap-root, divides the soil more than can be done by a fibrous-rooted plant; but as its bulbous root grows mostly above ground, it divides the soil less than the potato, the carrot, or the parsnip.

Red clover, in that respect, may be put in the same class with turnip.

Whether potatoes or turnip be the more gentle crop, appears a puzzling question. The farmer bears feed, and probably draws more nourishment from the soil than the latter, when cut green. On the other hand, potatoes divide the soil more than turnip, and leave it more loose and friable. It appears no less puzzling, to determine between cabbage and turnip: the former draws more of its nourishment from the air, the latter leaves the soil more free and open.

The reft of the whole is what follows: Culmiferous plants are robbers; some more, some less: they at the same time bind the soil; some more, some less. Leguminous plants in both respects are opposite; if any of them rob the soil, it is in a very slight degree; and all of them without exception loosen the soil. A culmiferous crop, however, is generally the more profitable: but few soils can long bear the burden of such crops, unless relieved by interjected leguminous crops.

Thee, on the other hand, without a mixture of culmiferous crops, would soon render the soil too loose.

These preliminaries will carry the farmer some length in directing a proper rotation of crops. Where dung, lime, or other manure, can be procured in plenty to recruit the soil after severe cropping, no rotation, whatever, is proper to profitable in a strong soil, than wheat, peas, or beans, barley, oats, fallow. The whole farm may be brought under this rotation, except so far as hay is wanted. But as such command of manure is rare, it is of more importance to determine what should be the rotation when no manure can be procured but the dung collected in the farm. Considering that culmiferous crops are the more profitable in rich land, it would be proper to make them more frequent than the other kind. But as there are few soils that will admit such frequent culmiferous crops without suffering, it may be laid down as a general rule, that alternate crops, culmiferous and leguminous, ought to form the rotation. Nor are there many soils that will stand good, even with this favourable rotation, unless relieved from time to time by fallowing a few years. If such extended rotation be artfully carried on, crops without end may be obtained in a tolerable good soil, without any manure but what is produced in the farm.

It is scarce necessary to be mentioned, being known to every farmer that clay answers best for wheat, moist clay for beans, loam for barley and peas, light soil for turnip, sandy soil for rye and buckwheat; and that oats thrive better in coarse soil than any other grain. Now, in directing a rotation, it is not sufficient that a culmiferous crop be always succeeded by a feredered, leguminous; attention must also be given to, that no crop be introduced that is unfit for the soil. Wheat, being a great binder, requires more than any other crop a leguminous crop to follow. But every field is not proper: potatoes are the greatest openers of soil; but they are improper in a wheat soil. Neither will turnip answer, because it requires a light soil. A very loose soil, after a crop of rye, requires rye-grass to bind it, or the treading of cattle in ploughing: but to bind the soil, wheat must not be ventured; for it succeeds ill in loose soil.

Another consideration of moment in directing the rotation, is to avoid crops that encourage weeds. Peas is the fittest of all crops for succeeding to wheat, because it renders the ground looser and mellow, and the same soil agrees with both. But beware of peas, unless the field be left by the wheat perfectly free of weeds, because peas, if not an extraordinary crop, suffer weeds. Barley may be ventured after wheat, if the farmer be unwilling to lose a crop. It is indeed a robber; better, however, any crop, than run the hazard of poisoning the soil with weeds. But to prevent the necessity of barley after wheat, the land ought to be fallowed before the wheat: it cleans the ground thoroughly, and makes peas a secure crop after wheat. And after a good crop of peas, barley never fails. A horse-hoed crop of turnip is equal to a fallow for rooting out weeds; but turnip does not suit land that is proper for wheat. Cabbage does well in wheat soil; and a horse-hoed crop of cabbage, which eradicates weeds, is a good preparation for wheat to be succeeded by peas; and a crop of beans diligently hand-hoed, is in that view little inferior. As red clover requires the ground to be perfectly clean, a good crop of it ensures wheat, and next peas. In loam, a drilled crop of turnip or potatoes prepares the ground, equal to a fallow, for the same succession.

Another rule is, to avoid a frequent repetition of the same species. For to produce good crops, change of species is no less necessary than change of feed. The same species returning every second or third year, will infallibly degenerate, and be a scanty crop. This is remarkably the case of red clover. Nor will our fields bear pleasantly perpetual crops of wheat after fallow, which is the practice of some English farmers.

Hitherto in the fame field. We add one rule concerning rotation in different fields; which is to avoid crowding crops one after another in point of time; but to choose such as admit intervals sufficient for leisurely dressing, which gives opportunity to manage all with the same bands, and with the same cattle; for example, beans in January or February, peas and oats in March, barley and potatoes in April, turnip in June or July, wheat and Rye in October.

For illustrating the foregoing rules, a few instances of exceptional rotations will not be thought amiss. Able rotations.

The following is an usual rotation in Norfolk. Firstly, wheat after red clover. Secondly, barley. Third, turnip. Fourth, barley with red clover. Fifth, clover cut for hay. Sixth, a second year's crop of clover commonly
Part II.

AGRICULTURE.

Practice.

Dung is given to the wheat and turnip; against this rotation several objections lie. Barley after wheat is improper. The two crops of barley are too near together. The second crop of clover must be very bad, if pasturing be the best way of consuming it; and if bad it is a great encourager of weeds. But the strongest objection is, that red clover repeated so frequently in the same field cannot fail to degenerate; and of this the Norfolk farmers begin to be sensible. Salton in East Lothian is a clay soil; and the rotation there is, Wheat after fallow and dung. Second, barley after two ploughings; the one before winter, the other immediately before the feed is fown. Third, oats. Fourth, peas. Fifth, barley. Sixth, oats; and then follow. This rotation consists chiefly of robbing crops. Peas are the only leguminous crop, which even with the fallow is not sufficient to loosen a stiff soil. But the soil is good, which in some measure hides the badness of the rotation. About Seaton, and all the way from Preston to Gosford, the ground is still more severely handled: wheat after fallow and dung, barley, oats, peas, wheat, barley, oats, and then another fallow. The soil is excellent; and it ought indeed to be so, to support many rounds of such cropping.

In the parishes of Tranent, Aberlady, Dirleton, North-Berwick, and Athelstanefoord, the following rotations were formerly universal, and to this day are much more frequent than any other mode.

1. After fallow with dung, wheat, barley, oats, peas and beans, barley, oats, wheat.
2. After fallow and dung, barley, oats, peas and beans, wheat, barley, oats, pea, wheat.
3. After fallow and dung, wheat, oats, pea, barley, oats, wheat.
4. After fallow and dung, barley, oats, beans, wheat, pea, barley, oats.

In the several Tours of Young, the itinerant farmer, are found, in the best counties of England, examples without end, of rotations no less exceptional than many of those mentioned.

7. Pasture, Pasture, Pasture, Pasture, Pasture.

Rotation in a clay soil.

When the rotation is completed, the seventh inclosure having been six years in pasture, is ready to be taken up for a rotation of crops which begins with oats in the year 1781, and proceeds as in the sixth inclosure. In the same year 1781, the fifth inclosure is made pasture, for which it is prepared by fowing pasture grasses seeds with the barley of the year 1780. And in this manner may the rotation be carried on without end. Here the labour is equally distributed; and there is no hurry nor confusion. But the chief property of this rotation is, that two culminating or white-corn crops are never found together: by a due mixture of crops, the soil is preserved in good heart without any adventitious manure. At the same time, the land is always producing plentiful crops: neither hay nor pasture get time to degenerate. The whole dung is laid upon the fallow.

Every farm that takes a grasses-crop into the rotation must be inclosed, which is peculiarly necessary in a clay soil, as nothing is more hurtful to clay than pasturing.

Rotation in a light soil.

1. 1775. 1776. 1777. 1778. 1779. 1780.
7. Pasture, Pasture, Pasture, Pasture, Pasture.

For the next rotation, the seventh inclosure is taken up for corn, beginning with an oat crop, and proceeding in the order of the fourth inclosure, in place of which, the third inclosure is laid down for pasture by sowing pasture-grasses with the last crop in that inclosure, being barley. This rotation has all the advantages.

Fields not to be kept too long in pasture.
This leads to the hands that are commonly engaged to cut down corn. In Scotland, the universal practice was, to provide a number of hands, in proportion to the extent of the crop, without regard to the time of ripening. By this method, the reapers were often idle for want of work; and what is much worse, they had often more work than they could undertake, and ripe fields were laid open to baking winds. The Lothians have long enjoyed weekly markers for reapers, where a farmer can provide himself with the number he wants; and this practice is creeping into neighbouring shires. Where there is no opportunity of such markets, neighbouring farmers ought to agree in borrowing and lending their reapers.

One should imagine, that a caution against cutting corn when wet is unnecessary; yet from the impatience of farmers to prevent shaking, no caveat is more fo. Why do they not consider that corn standing dry in half a day, when in a close field, the weather must be favourable if it dry in a month? In moist weather it will never dry.

With respect to the manner of cutting, we must pre. Manner of cutting: that barley is of all the most difficult grain to be dried for keeping. Having no huf, rain his easy access; and it has a tendency to malton when wet. Where the ground is properly smoothed by rolling, it seems best to cut it down with the flythe. This manner being more expeditious than the fliske, removes it sooner from danger of wind; and gives a third more straw, which is a capital article for dung, where a farm is at a distance from other nature. We except only corn that has lodged; for there the fliske is more convenient than the flythe. As it ought to be dry when cut, bind it up directly; if allowed to lie any time fit the swath, it is apt to be discoloured. Barley flown with grass-seeds, red clover especially, requires a different management. Where the grass is cut along with it, the difficulty is great of getting it for dry as to be ventured in a stack. The best way is, to cut the barley with a fliske above the clover, so that nothing but clean barley is bound up. Cut with a flythe the fliske and grasses: they make excellent winter food. The same method is applicable to oats; with this only difference, that when the field is exposed to the west wind, it is left necessary to bind immediately after mowing. As wheat commonly grows higher than any other grain, it is difficult to manage it with the flythe, for which reason the fliske is preferred in England. Peas and beans grow so irregularly, as to make the fliske necessary.

Sect. VI. Of Reaping Corn and Hay Crops, and Storing them up for use.

Culmiferous plants are ripe when the stem is totally white: they are not fully ripe if any green streaks remain. Some farmers are of opinion, that it would not be cut before it is fully ripe. Their reasons are, first, that ripe wheat is apt to shatter; and next, that the flour is not so good. With respect to the last, it is contrary to nature, that any seed can be better in an unripe state than when brought to perfection; nor will it be found so upon trial. With respect to the first, wheat, at the point of perfection, is not more apt to shatter than for some days before; the husks begin not to open till after the seed is fully ripe; and then suffering the crop to it is no more as ticklish: after the minute of ripening, it should be cut down in an instant, if possible.

The best way for drying peas, is to keep separate of the handful that are cut; in this way they wet pre. Early, they dry as soon. In the common way of heap- ing peas together for compounding a sheaf, they wet as early, and dry not so soon. With reaper-shapes, the top of the handful left out, ought to be laid on the bottom of the turner, which gives ready access to the wind. By this method peas and beans are ready for the stack in half the ordinary time.

A sheaf commonly is made as large as can be contained in two lengths of the corn: these being laid up and tied, the binder pretends it down with his knee, and binds it hard as totally to exclude the air. If there be any moisture in the crop, which seldom fails, a process of fermentation and putrefaction commences;
Agriculture.

Part II.

Carrying off the sheaves.

Every article is of importance that hastens the operations in a country, subjected to unequal harvest weather; for which reason, the most expedient method should be chosen for carrying corn from the field to the stack-yard. Our carriages are generally too small or too large. A sled is a very awkward machine; many hands are required, and little progress is made. Wagons and large carts are littleleaf dilatory, as they must stand in the yard till unloaded sheaf by sheaf. The best way is, to use long carts moveable upon the axle, so as to throw the whole load on the ground, which is forked up to the stack by a hand appointed for that purpose. By this method, two carts will do the work of four or five.

Stacking.

Building round stacks in the yard is undoubtedly preferable to housing corn. There it is that up from the air, and it must be exceedingly dry; if it contract not a mutiline, which is the first step to putrefaction. Add to this, that in the yard, a stack is preferred from rats and mice, being fin on a pedestal; whereas no method has hitherto been invented for preferring corn in a house from such destructive vermin. The proper manner of building, is to make every sheaf incline downward from its top to its bottom. Where the sheaves are laid horizontally, the stack will take in rain both above and below. The best form of a stack is that of a cone placed on a cylinder; and the top of the cone should be formed with three sheaves drawn to a point. If the upper part of the cylinder be a little wider than the under, so much the better.

The delaying to cover a stack for two or three weeks, though common, is, however, exceedingly absurd; for if much rain fall in the interim, it is beyond the power of wind to dry the stack. Vegetation begins in the external parts, flush out the air from the internal; and to prevent a total putrefaction, the stack must be thrown down, and exposed to the air, every sheaf. In order to have a stack covered the moment it is finished, straw and ropes ought to be ready; and the covering ought to be so thick as to be proof against rain.

Scotland is subject not only to floods of rain, but to high winds. Good covering guards against the former, and ropes carefully applied guard against the latter. The following is a good mode. Take a hay-rope well twisted, and surround the stack with it, two feet or so below the top. Surround the stack with another such rope immediately below the casing. Connect these two with ropes in an up-and-down position, distant from each other at the casing about five or six feet. Then surround the stack with other circular ropes parallel to the two first mentioned, giving them a twist round every one of these that lie up and down by which the whole will be connected together in a sort of net-work. What remains is, to finish the two feet at the top of the stack. Let it be covered with bunches of straw laid regularly up and down; the under part to be put under the circular rope first mentioned, which will keep it fast, and the upper part be bound by a small rope artfully twisted, commonly called the crown of the stack. This method is preferable to the common way of laying long ropes over the top of the stack, and tying them to the belting-rope; which flattens the top, and makes it take in rain. A stack covered in the way here described, will stand two years secure both against wind and rain; an a notable advantage in a variable climate.

The great aim in making hay is, to preserve as much of the sap as possible. All agree in this; and yet it differs widely in the means of making that aim effectual. To describe all the different methods would be equally tedious and unprofitable. We shall confine ourselves to two, which appear preferable to all others. A crop of rye-grass and yellow clover ought to be spread as cut. A day or two after, when the dew is evaporated, rake it into a number of parallel rows along the field, termed wind-rows, for the convenience of putting it up into final cocks. After turning the rows once and again, make small cocks weighing a stone or two. At the distance of two days or so, put two cocks into one, observing always to mix the tops and bottoms together, and to take a new place for each cock, that the least damage possible may be done to the grass. Proceed in putting two cocks into one, till sufficiently dry for tramp-ricks of 100 stone each. The easiest way of erecting tramp-ricks, is to found a rick in the middle of the row of cocks that are to compose it. The cocks may be carried to the rick by two persons joining arms together. When all the cocks are thus carried to the rick within the distance of 40 yards or so, the rest of the cocks will be more expeditiously carried to the rick, by a rope wound about them and dragged by a horse. Two ropes are sufficient to secure the ricks from wind the short time they are to stand in the field. In the year 1775, 10,000 stone were put into tramp-ricks the fourth day after cutting. In a country far wet as many parts of Scotland are, expeditions of mighty consequence in the drying both of hay and corn. With respect to hay intended for horned cattle, it is by the generality held an improvement, that it be heated a little in the stack. But we violently suspect this doctrine to have been invented for exciting indolent management. An ox, it is true, will eat hay; but it will always be found that he prefers sweet hay; and
Part II.

AGRICUL TURE.

Practice.

Hay of red clover.

It cannot well be doubted, but that such hay is the most salutary and the most nourishing.

The making hay consisting chiefly of red-clover requires more care. The season of cutting is the last week of June, when it is in full bloom; earlier it may be cut, but never later. To cut it later would indeed produce a weightier crop; but a late first cutting makes the second also late, perhaps too late for drying. At the same time, the want of weight in an early first cutting, is amply compensated by the weight of the second.

When the season is too variable for making hay of the second growth, mix straw with that growth, which will be a substantial food for cattle during winter. This is commonly done by laying strata of the straw and clover alternately in the stack. But by this method, the strata of clover, if they do not heat, turn mouldy at least, and unpalatable. The better way is, to mix them carefully with the hand before they be put into the stack. The dry straw imbibles moisture from the clover and prevents heating.

But the best method of hay-making seems to be that recommended by Mr. Anderson. "Instead," says he, "of allowing the hay to lie, as usual in most places, for some days in the straw after it is cut, and afterwards alternately putting it up into cocks and spreading it out, and topdressing it in the sun, which tends greatly to bleach the hay, excites its natural juices, and subjects it very much to the danger of getting rain, and thus runs a great risk of being of good little, I make it a general rule, if possible, never to cut hay but when the grass is quite dry; and then make the gatherers follow close upon the cutters, putting it up immediately into small cocks about three feet high each when new put up, and of as small a diameter as they can be made to stand with; always giving each of them a kind of thrashing, by drawing a few handfuls of the hay from the bottom of the cock all around, and laying it lightly upon the top with one of the ends hanging downwards. This is done with the utmost care and expedition; and when it is once in that state, the hay is as dry as if a perfect and immediate drying had already been done. For this reason, if at any time during a course of good settled weather you should begin to cut in the morning before the dew is off the grass, keep back the gatherers till the dew is evaporated; allowing that which was first cut to lie till it is dry before it is cocked. In this case, you will almost always find that the uncut grass will dry sooner than that which has been cut when wet; and, therefore, the gatherers may always begin to put up that which is fresh cut before the other; which will usually require two or three hours to dry after the new-cut hay may be cocked. And if, at any time, in case of necessity, you should be obliged to cut your hay before it is dry, the same rule must be observed, always to allow it to remain in the straw till it is quite dry; but, as there is always a great risk of being long in getting it

(a) If the hay is to be carried to any considerable distance, this part of the labour may be greatly abridged, by causing the carriers to take two long ricks of a sufficient strength, and having laid them down by the small cocks, parallel to one another, at the distance of one and a half, or two feet asunder, let them lift three or four cocks, one after another, and place them carefully above the ricks, and then carry them altogether, as if upon a hand-barrow, to the place where the large rick is to be built.
A R G I C U L T U R E.

Part II.

A stack of clover-hay in the same circumstances weighs somewhat less.

Sect. VII. Manures.

The manures commonly used are dung, lime, shell-marl, clay-marl, and stone-marl. Many other substances are used; shavings of horn, for example, refuse of malt, and even old rags: but as the quantity that can be procured is inconsiderable, and as their application is simple, we shall confine us time upon them.

Dung is the chief of all manures; because a quantity of it may be collected in every farm, and because it makes the quickest return. A field sufficiently dunged will produce good crops four or five years.

Dung of animals that chew the cud, being more thoroughly purerfeed than that of others, is fit to be mixed with the foil without needing to be collected into a dunghill. A horse does not chew the cud; and in horfe-dung may be perceived straw or rye-grafs broken into small parts, but not dissolved: it is proper therefore that the putrefaction be completed in a dunghill. It ought to be mixed there with cool materials: for it is, that, in a dunghill by itself, it singses and burns instead of putrefying. The difference between the dung of a horse and of a horned animal, is visible in a pasture-field: the graps round the former is withered; round the latter, it is ranker and more verdant than in the rest of the field. A mixture of dry and moist stuff ought to be studied: the former attracting moisture from the latter, they become equally moist.

To prevent sap from running out of a dunghill, its surface should be a little below the surface; and to hinder prevent rain from running into it, it should be surrounded with a ring of foil. If the soil on which the dunghill stands be porous, let it be paved, to prevent the sap from sinking into the ground. If moisture happen to superabound, it may be led off by a small gutter to impregnate a quantity of rich mould laid down to receive it, which will make it equal to good dung.

Straw should be prepared for the dunghill, by being laid under cattle, and sufficiently moistened. When laid dry into a dunghill, it keeps it open, and admits too much air, and prevents putrefaction.

Dung from the stable ought to be carefully spread on the dunghill, and mixed with the former dung. When left in heaps upon the dunghill, fermentation and putrefaction go on unequally.

Complete putrefaction is of importance with regard to the seed of weeds that are in the dunghill: if they remain found, they are carried out with the dung, and infest the ground. Complete putrefaction is of still greater importance by pulverizing the dung; in which condition it mixes intimately with the foil, and operates the most powerfully. In land intended for barley, undigested dung has a very bad effect: it keeps the ground open, admits drought, and prevents the seed from sprouting. On the other hand, when thoroughly rotted, it mixes with the foil, and enables it to retain moisture. It follows, that the properest time for dunging a field,
Part II. **Agriculture.**

**Practice.**

315

207 **Time for dunging.**

Dung should be spread, and ploughed into the ground without delay. When a heap lies two or three weeks, some of the moisture is imbied into the ground, which will produce tufts of corn more vigorous than in the rest of the field. There cannot be a worse practice than to lead our dung before winter, leaving it exposed to frost and snow. The whole spirit of the dung is extracted by rain, and carried off with it. The dungdivvided of its sap becomes dry in spring, and incapable of being mixed with the mould. It is turned over whole by the plough, and buried in the furrow.

208 **Manner of dunging.**

As dung is an article of the utmost importance in husbandry, one should imagine, that the collecting it would be a capital article with an industrious farmer. Yet an ingenious writer, observing that the Jamaicans are in this particular much more industrious than the British, ascribes the difficulty of procuring dung in Jamaica. "In England, where the long winter enables a farmer to raise what quantity he pleases, it is not collected with any degree of industry. But in Jamaica, where there is no winter, and where the heat of the sun is a great obstruction, the farmer must be industrious, or he will never get any dung." Cool interest is not alone a sufficient motive with the indolent, to be active. As dung is of great importance in husbandry, a farmer cannot be too afidious in collecting animal and vegetable substances that will rot. One article of that kind there is, to collect which there is a double motive, and yet is neglected almost every where. A farm full of weeds is a nuisance to the neighbourhood: it poisons the fields around; and the pollestor ought to be disgraced as a pest to society. Now the cutting down every weed before the feed is formed, answers two excellent purposes. First, it encourages good crops, by keeping the ground clean. Next, these weeds mixed with other materials in a dunghill, may add considerably to the quantity of dung.

210 **Of lime.**

Next of lime, which is a profitable manure, and greatly so when it can be got in plenty within a moderate distance. The benefit of lime is so visible, that the use of it has become general, where the price and carriage are in any degree moderate.

However people may differ in other particulars, all agree, that the operation of lime depends on its intimate mixture with the soil; and therefore that the proper time of applying it, is when it is perfectly powdered and the soil at the same time in the highest degree of pulverization. Lime of itself is absolutely barren: and yet it enriches a barren soil. Neither of the two produces any good effect without the other: and consequently, the more intimately they are mixed, the effect must be the greater.

Hence it follows, that lime ought always to be flaked with a proper quantity of water, because by that means it is reduced the most effectually into powder. Lime left to be flaked by a moist air, or accidental rain, is seldom or never thoroughly reduced into powder; and therefore can never be intimately mixed with the soil. Sometimes an opportunity offers to bring home shell-lime before the ground is ready for it; and it is commonly thrown into a heap without cover, trudging to rain for flaking. The proper way is, to lay the shell-lime in different heaps on the ground where it is to be spread, to reduce these heaps into powder by flaking it with water, and to cover the flaked lime with sods as to defend it from rain. One however should avoid as much as possible the bringing home lime before the ground be ready for it. Where allowed to lie long in a heap, there are two bad consequences: first, lime attracts moisture, even though well covered, and runs into cloths, which prevents an intimate mixture; and, next, we know, that burnt limestone, whether in shells or in powder, returns gradually into its original state of limestone; and upon that account also, is less capable of being mixed with the soil. And this is verified by a fact, that, after lying long, it is so hard bound together as to require a pick to separate the parts.

For the same reason, it is a bad practice, though common, to let spread lime lie on the surface all winter. The bad effects above mentioned take place here in part: and there is another; that rain washes the lime down to the furrows, and in a hanging field carries the whole away.

As the particles of powdered lime are both small and heavy, they quickly sink to the bottom of the furrow, if they be not taken to prevent it. In that view, it is a rule, that lime be spread, and mixed with the soil, immediately before fowing, or along with the feed. In this manner of application, there being no occasion to move it till the ground be flirred for a new crop, it has time to incorporate with the soil, and does not readily separate from it. Thus, if turnip-feed is to be fown broadcast, the lime ought to be laid on immediately before fowing, and harrowed in with the feed. If a crop of drilled turnip or cabbages be intended, the lime ought to be spread immediately before forming in drills. With respect to wheat, the lime ought to be spread immediately before feed-furrowing. If spread much earlier, before the ground be sufficiently broken, it will sink to the bottom. If a lighter feed is taken, for barley, the lime ought to be spread after feed-furrowing, and harrowed in with the feed. In a strong soil, it sinks not so readily to the bottom; and therefore, before fowing the barley, the lime ought to be mixed with the soil by a brake. Where moor is furrowed for a crop of oats next year, the lime ought to be laid on immediately before the last ploughing, and braked in as before. It has sufficient time to incorporate with the soil before the land be flirred again.

The quantity to be laid on depends on the nature of the soil. Upon a strong soil, 70 or 80 bolls of shells are not more than sufficient, reckoning four small flirtos to the boll, termed wheat-measurens; nor will it be an oversode to lay on 100 bolls. Between 50 and 60 may suffice upon medium soils; and upon the thin or gravelly, between 30 and 40. It is not safe to lay a much greater quantity on such soils.

It is common to lime a pasture-field immediately before ploughing. This is an unsafe practice; it is thrown to the bottom of the furrow, from which it is never fully gathered up. The proper time for liming

R 2
Agriculture.

Part II.

Summer is the proper season for marling; because in that season the marl, being dry, is not only lighter, but is easily reduced to powder. Frost however is not improper for marling, especially as in frost there is little opportunity for any other work.

Marl is a heavy body, and sinks to the bottom of the furrow, if indirectly ploughed. Therefore the first crop should always have an ebb furrow. During the growing of that crop, the marl has time to incorporate with the soil, and to become a part of it; after which it does not readily separate.

Sect. VIII. Principles and Operations of the New or Horfhe-hoeing Husbandry.

The general properties attributed to the new husbandry may be reduced to two, viz. the promoting the growth of plants by hoeing, and the saving of seed; both of which are equally profitable to the farmer.

The advantages of tillage before sowing have already been pointed out. In this place we must confine ourselves to the utility of tillage after sowing. This kind of tillage is most generally known by the name of horfhe-hoeing.

Land fowed with wheat, however well it may be cultivated in autumn, sinks in the winter; the particles get nearer together, and the weeds rise; so that in spring, the land is nearly in the same situation as if it never had been ploughed. This, however, is the season when it should branch and grow with moft vigour; and consequently stands in need of ploughing or hoeing, to destroy the weeds, to supply the roots with fresh earth, and, by dividing anew the particles of the soil, to allow the roots to extend and collect nourishment.

It is well known, that, in gardens, plants grow with double vigour after being hoed or transplanted. If plants growing in arable land could be managed with care and safety in this manner, it is natural to expect, that their growth would be promoted accordingly. Experience shows, that this is not only practicable, but attended with many advantages.

The operation of hoeing in winter wheat, though some of the roots be moved or broken, the plants receive no injury, for this very circumstance makes them send forth a greater number of roots than formerly, which enlarge their pature, and consequently augment their growth.

Sickly wheat has often recovered its vigour after a good hoeing, especially when performed in weather not very hot or dry.

Wheat, and much grass as is sown before winter, requires hoeing more than oats, barley, or other grain sown in the spring; for, if the land has been well ploughed before the sowing of spring-corn, it neither has time to harden, nor to produce many weeds, not having been exposed to the winter’s snow and rain.

Of Sowing.

As, in the practice of the New Husbandry, plants grow with greater vigour than by the old method, the sowing in the New Husbandry land should be sowed thinner. It is this principle of the new husbandry that has been chiefly objected to; for, upon observing the land occupied by a small number of plants, people are apt to look upon all the vacant.

Practi.

Limestone beat small makes an excellent manure, and suppies the want of powdered lime where there is no fuel to burn the lime. Limestone beat small has not hitherto been much used as a manure; and the proportion between it and powdered lime has not been ascertained. What follows may give some light.

Three pounds of raw lime is by burning reduced to two pounds of shell-lime. Yet nothing is expelled by the fire but the air that was in the limestone; the calcareous earth remains entire. Erge, two pounds of shell-lime contain as much calcareous earth as three pounds of raw lime. Shell-lime of the best quality, when flaked with water, will measure out to thrice the quantity. But as limestone loses none of its bulk by being burnt into shell, it follows, that three bushels of raw lime contain as much calcareous earth as six bushels of powdered lime; and consequently, if powdered lime poftels not some virtue above raw lime, three bushels of the latter beat small should equal as a manure six bushels of the former.

Shell-marl, as a manure, is managed in every respect like powdered lime; with this only difference, that a fifth or a fourth part more in measure ought to be given. The reason is, that shell-marl is less weigh-ty than lime; and that a ball of it contains less calcareous earth, which is the frustrating part of both.

Clay and fine marls, with respect to husbandry, are the same, though in appearance different.

The goodness of marl depends on the quantity of calcareous earth in it: which has been known to amount to a half or more. It is too expensive if the quantity be less than a third or a fourth part. Good marl is the most substantial of all manures; because it improves the weakest ground to equal the best borough-acres. The low part of Berwickshire termed the Merse, abounds everywhere with this marl; and is the only county in Scotland where it is plenty.

Land ought to be cleared of weeds before marling; and marling is performed with the harrow and the brush, in order that the marl may be equally spread. Marl is a folil on which no vegetable will grow; its efficacy depends, like that of lime, on its pulverization, and intimate mixture with the soil. Toward the former, alternate drought and moisture contribute greatly, as also frost. Therefore, after being evenly spread, it ought to lie on the surface all winter. In the month of Octo-ber it may be roused with a brake; which will bring to the surface, and expel to the air and frost, all the hard parts, and mix with the soil all that is powdered. In that respect it differs widely from dung and lime, which ought to be ploughed into the ground without delay. Oats in the new marl, which will answer for being the first crop after marling better than any other; and it will succeed though the marl be not thoroughly mixed with the soil. In that cafe, the marl ought to be ploughed in with an ebb furrow immediately before sowing, and braked thoroughly. It is tickish to make wheat the first crop: if sown before winter, root swells the marl, and is apt to throw the seed out of the ground; if sown in spring, it will suffer more than oats by want of due mixture.
Part II. AGRICULTURE.

Prep. can't space as lost. But this prejudice will soon be removed when it is considered, that, in the best land cultivated in the common method, and sown very thick, each seed produced but one or two ears; that, in the same land, the thinner, every seed produces two or three ears; and that a single seed sometimes produces

In the common method, there are many more plants that can find sufficient nourishment, and as it is impossible to lift them by hoeing; numbers die before they attain maturity, the greatest part remain sickly and drooping; and thus part of the seed is lost. On the contrary, in the new method, all the plants have as much food as they require; and as they are, from time to time, alleviated by hoeing, they become more vigorous as to equal in their production the numerous but sickly plants cultivated in the common method.

Of Hoeing.

The new husbandry is absolutely impracticable in lands that are not easily ploughed. Attempting to cultivate land according to this husbandry, without attending to this circumstance, that it is practicable in no land except in such as have already been brought into good tillth by the old method, has gone far to make it contemptible in many places.

When a field is in good tillth, it should be sown so thin as to leave sufficient room for the plants to extend their roots. After being well ploughed and harrowed, it must be divided into rows, at the distance of thirty inches from one another. On the sides of each of these rows, two rows of wheat must be sown six inches distant from each other. By this means there will be an interval of two feet wide between the rows, and every plant will have room enough to extend its roots, and to supply it with food. The intervals will likewise be sufficient for allowing the earth to be hoed or tilled without injuring the plants in the rows.

The first hoeing, which should be given before the winter, is intended to drain away the wet, and to diffuse the earth to be mellowed by the frosts. These two ends will be answered by hoeing the rows to little distance from the rows, and throwing the earth taken from the furrows into the middle of the intervals. This first hoeing should be given when the wheat is in ear.

The second hoeing, which is intended to make the plants branch, should be given after the hard frosts are over. To do this with advantage, after stirring the earth about near the rows, the earth which was thrown in the middle of the intervals should be turned back into the furrows. This earth, having been mellowed by the winter, supplies the plants with excellent food, and makes the roots extend.

The third hoeing, which is intended to invigorate the stalk, should be given when the ears of the corn begin to show themselves. This hoeing may, however, be very light.

But the last hoeing is of the greatest importance, as it enlarges the grain, and makes the ears fill at their extremities. This hoeing should be given when the wheat is in bloom; a furrow must be drawn in the middle of the interval, and the earth thrown to the right and left on the root of the plants. This supports the plants, prevents them from being laid, and prepares the ground for the next sowing, as the soil is then to be put in the middle of the ground that formed the intervals.

The best season for hoeing is two or three days after rain, or soon after rain as the soil will quit the instrument in hoeing. Light dry soils may be hoed almost any time, but this is far from being the case with strong clay soils: the season for hoeing such is frequently short and precarious; every opportunity therefore should be carefully watched, and eagerly embraced. The two extremes of wet and dry, are great enemies to vegetation in strong clay soils. There is a period between the time of clay soils running together, as to puddle by superfluous wet, and the time of their baking by drought, that they are as tradable as need be. This is the juncture for hoeing; and so much land as shall be thus feasibly hoed, will not cake or crust upon the surface, as it otherwise would have done, till it has been soaked or drenched again with rain; in which case the hoeing is to be repeated as soon as the soil will quit the instrument, and as often as necessary; by which time the growing crop will begin to cover the ground, so as to act as a screen to the surface of the land against the intense heat of the sun, and thereby prevent, in great measure, the bad effects of the soil's baking in dry weather.

By this successive tillage, or hoeing, good crops will be obtained, provided the weather is not very favourable.

But as strong, vigorous plants are longer before they arrive at maturity, corn raised in the new way is later in ripening than any other, and must therefore be sown earlier.

In order to prepare the intervals for sowing again, some well-rotted dung may be laid in the deep furrows made in the middle of the intervals; and this dung must be covered with the earth that was before thrown towards the rows of wheat. But, if the land does not require mending, the deep furrow is filled without any dung. This operation should be performed immediately after the harvest, that there may be time to give the land a flight before the rows are sowed; which should occupy the middle of the space which formed the intervals during the last crop. The intervals of the second year take up the space occupied by the stubble of the first.

Supposing dung to be necessary, which is denied by many, a very small quantity is sufficient; a single layer, put in the bottom of each furrow, will be enough.

Description of the Instruments for only used in the New Husbandry.

Fig. 1. is a marking plough. The principal parts of Instrument this plough is to straight and regulate the ridges. The first line is traced by the eye, by means of three poles, placed in a straight line. The plough draws the first furrow in the direction of this line; and at the same time, with the tooth A, fixed in the block of wood near the end of the cross-pole or slider B, marks the breadth of the ridge at the distance intended. The ploughman next traces the second line or rut made by the tooth, and draws a small furrow along it; and continues in this manner till the whole field is laid out in straight and equidistant ridges.
Plate VIII.

Fig. 2. is a plough for breaking up lea, or turning up the bottom of the land when greatly exhausted. By its construction, the width and depth of the furrows can be regulated to a greater certainty than by any other hitherto known in this country. Its appearance is heavy, but two horses are sufficient to plough with it in ordinary free land; and only four are necessary in the stiffest clay-soils. This plough is likewise easily held and tempered. A, is the sword fixed in the hizors B, which runs through a mortise E, at the end of the beam C, and regulates the depth of the furrow by raising or depressing the beam; it is fixed by putting the pin D thro' the beam and sword, and is movable at E.

Fig. 3. is a jointed brake-harrow with 24 teeth, shaped like coulters, and standing at about an angle of 80 degrees. By this instrument the land is finely pulverized, and prepared for receiving the seed from the drill. It requires four horses in full and two in open land. This harrow is likewise used for levelling the ridges; which is done by pressing it down by the handles where the ridge is high, and raising it up when low.

Fig. 4. is an angular weeding harrow, which may follow the brake when necessary. The seven hindmost teeth should stand at a more acute angle than the rest, in order to collect the weeds, which the holder can draw at pleasure, by raising the hinder part, which is fixed to the body of the harrow by two joints.

Fig. 5. is a pair of harrows with shafts. This harrow is used for covering the seed in the drills, the horse going in the furrow.

Fig. 6. is a drill-plough, constructed in such a manner as to throw at once two rows of beans, peas, or wheat. This machine is easily wrought by two horses. A, is the hopper for containing the seed; B, circular boxes for receiving the seed from the hopper; CC, two square boxes which receive the seed from small holes in the circular boxes, as they turn round; and last of all, the seed is dropped into the drills through holes in the square boxes, behind the coulters D. The cylinder E follows, together with the wheel F, which regulates the depth of the coulters, and covers the seed; the harrow G comes behind all, and covers the seed more completely. H, H, two sliders, which, when drawn out, prevent the seed from falling into the boxes; and, I, is a catch which holds the rungs, and prevents the boxes from turning, and loosing feed at the ends of the ridges.

Fig. 7. is a single hoe-plough of a very simple construction, by which the earth in the intervals is stirred and laid up on both sides to the roots of the plants, and at the same time the weeds are destroyed. A A are the mould-boards, which may be raised or depressed as follows, according as the farmer wants to throw the earth higher or lower upon the roots.

Fig. 8. is a drill-rake for peas. This instrument, which is chiefly calculated for small inclosures of light grounds, is a sort of strong plough rake, with four large teeth at a, a, b, and c, a little incurved. The distance from a to a, and from b to b, is nine inches. The interval between the two inner teeth a and b, is three feet six inches, which allows sufficient room for the hole-plough to move in. To the piece of timber e, forming the head of the rake, are fixed the handles d, and the beam ε, to which the horse is fastened. When this instrument is drawn over a piece of land made thoroughly fine, and the man who holds it bears upon the handles, four furrows fi, gi, hi, will be formed, at the distance determined by the construction of the instrument. These furrows may be accurately preserved, provided that the teeth as return when the ploughman comes back, after having ploughed one turn, in two of the channels formed before, marked b, b, thus all the furrows in the field will be traced with the same regularity. When the ground is thus formed into drills, the pea may be scattered by a single motion of the hand at a certain distance from one another into the channels, and then covered with the flat part of a hand-rake, and pressed down gently. This instrument is so simple, that any workman may easily make or repair it.

On Plate IX. is delineated a patent drill machine, lately invented by the Reverend James Cooke of Heaton-Norris near Manchester. A, the upper part of the feed-box. B, the lower part of the same box. C, a movable partition, with a lever, by which the grain or feed is let fall at pleasure from the upper to the lower part of the feed-box, from whence it is taken up by cups or ladles applied to the cylinder D, and dropped into the funnel E, and conveyed thereby into the furrow or drill made in the land by the coulter F, and covered by the rake or harrow G. H, a lever, by which the wheel is lifted out of generation with the wheel K, to prevent the grain or feed being scattered upon the ground, while the machine is turning round at the end of the land, by which the harrow G is also lifted from the ground at the same time, and by the same motion, by means of the crank, and the horizontal lever h, h. I, a sliding lever, with a weight upon it, by means of which, the depth of the furrows or drills, and consequently the depth that the grain or feed will be deposited in the land, may be easily ascertained. M, a screw in the coulter beam, by turning of which, the feed-box B is elevated or depressed, in order to prevent the grain or feed being crushed or bruised by the revolution of the cups or ladles. Fig. 12. a rake with iron teeth, to be applied to the under side of the rails of the machine, with staples and screw nuts at a, by which many useful purposes are answered, viz. in accumulating caulk or hay into rows, and as a scutariator for young crops of wheat in the spring, or to be used upon a fallow; in which case, the feed-box, the ladle cylinder, the coulters, the funnels, and harrows, are all taken away.

This side view of the machine is represented, for the sake of perspicuity, with one feed-box only, one coulter, one funnel, one harrow, &c. whereas a complete machine is furnished with five coulters, five harrows, seven funnels, a feed-box in eight partitions, &c. with ladies of different sizes, for different sorts of grain and feeds.

These machines, (with five coulters sixteen guineas, with four coulters fifteen guineas) equally excel in letting or planting all sorts of grain and feeds, even carrot feed, to exactness, after the rate of from eight to ten chain acres per day, with one man, a boy, and two horses. They deposite the grain or feed in any given quantity from one peck to three bushels per acre, regularly and uniformly, and that without grinding or bruising the feed, and at any given depth, from half an inch to half a dozen inches, in rows at the distance of
The person who attends the machine should put down the lever H soon enough at the end of the land, that the cups or ladles may have time to fill, before he begins to sow; and at the end of the land, he must apply his right hand to the middle of the rail between the handles, by which he will keep the coulters in the ground, while he is lifting up the lever H with his left hand, to prevent the grain being scattered upon the headland, while the machine is turning round; this he will do with great ease, by continuing his right hand upon the rail between the handles, and applying his left arm to the left handle, in order to lift the coulters out of the ground while the machine is turning round.

If there be any difficulty in using the machine, it consists in driving it straight. As to the person who attends the machine, he cannot possibly commit any errors, except such as are wilful, particularly as he sees at one view the whole process of the business, viz. that the coulters make the drills of a proper depth; that the funnels continue open to convey the grain or feed into the drills; that the rakes or harrows cover the grain sufficiently; and when feed is wanting in the lower boxes B, which he cannot avoid seeing, he readily supplies them from the upper boxes A, by applying his hand, as the machine goes along, to the lever C. The lower boxes B should not be suffered to become empty before they are supplied with feed, but should be kept nearly full, or within an inch or so of the edge of the box.

If chalk lines are made across the backs of the coulters, at such a distance from the ends as the seed should be deposited in the ground (viz. about two inches for wheat, and from two to three for spring corn), the person that attends the machine will be better able to ascertain the depth the seed should be deposited in the drills, by observing, as the machine goes along, whether the chalk lines are above or below the surface of the land; if above a proper weight must be applied to the lever L, which will force the coulters into the ground; if below, the lever L and weight must be reversed, which will prevent their sinking too deep.

In different parts of the kingdom, lands or ridges are of different sizes: where the machine is too wide for the land, one or more funnels may occasionally be stopped with a little loose paper, and the feed received into such funnel returned at the end of the land, or sooner if required, into the upper feed-box. But for regularity and expedition, lands confining of so many feet wide from outside to outside, as the machine contains coulters, when fixed at twelve inches distance, or twice or three times the number, &c. are best calculated for the machine. In wet soils or strong clays, lands or ridges of the width of the machine, and in dry soils, twice the width, are recommended. For fowing of narrow high-ridged lands, the outside coulters should be let down, and the middle ones raised, so that the points of the coulters may form the same curve that the land or ridge forms. And the loose foil hallowed down into the furrows should be returned to the edges of the lands or ridges from whence it came, by a double mould-board or other plough, whether the land be wet or dry.

Clover or other hays, intended to be sown by the machine.
Agriculture.

Part II.

1. It is indispensably necessary that the farmer be furnished with a drill and hoe-plough.

2. The new husbandry may be begun either with the winter or spring corn.

3. The land must be prepared by four good ploughings, given at different times, from the beginning of April to the middle of September.

4. These ploughings must be done in dry weather, to prevent the earth from kneading.

5. The land must be harrowed in the same manner as it were sowed in the common way.

6. The rows of wheat should be sowed very straight.

7. When the field is not very large, a line must be straitened across it, by which a rill may be traced with a hoe for the horse that draws the drill to go in; and when the rows are sown, so inches must be left between each rill. But, when the field is large, stakes at five feet distance from each other must be placed at the two ends.

8. The fowing should be finished at the end of September, or the beginning of October.

9. The furrows must be traced the long way of the land, that as little ground as possible may be left in the head-lands.

10. The rows, if it can be done, should run down the slope of the land, that the water may get the easier off.

11. The feed-wheat must be plunged into a tub of lime-water, and stirred, that the light corn may come to the surface and be skimmed off.

12. The feed must be next spread on a floor, and frequently stirred, till it is dry enough to run through the valves of the hopper of the drill.

13. To prevent fruit, the feed may be put into a ley of allies and lime.

14. Good
Part II. AGRICULTURE.

14. Good old bread-wheat should be chosen in preference to new, as it is found by experience not to be so subject to fin.  
15. After the hoppers of the drill are filled, the horse must go slowly along the furrow that was traced. That a proper quantity of seed may be sown, the aperture of the hopper must be fitted to the size of the grain.  
16. As the drill is seldom well managed at first, the field should be examined after the corn has come up, and the deficiencies supplied.

17. Upon wet soils or strong clays, wheat should not be deposited more than two inches deep, on any account whatever; nor less than two inches deep, on dry soils. From two to three inches is a medium depth for all spring corn. But the exact depth at which grain should be deposited in different soils, from the lightest land to the strongest clay, is readily ascertained only by observing at what distance under the surface of the land, the secondary or coronal roots are formed in the springing.

18. Stiff lands, that retain the wet, must be stirred or hoed in October. This should be done by opening a furrow in the middle of the intervals, and afterward, filling it up by a furrow drawn on each side, which will raise the earth in the middle of the intervals, and leave two small furrows next the rows, for draining off the water, which is very hurtful to wheat in winter.

19. The next stirring must be given about the end of March, with a light plough. In this stirring the furrows made to drain the rows must be filled up by earth from the middle of the intervals.

20. Some time in May, the rows must be even; which, though troublesome at first, soon becomes easy, as the weeds are soon kept under by tillage.

21. In June, just before the wheat is in bloom, another stirring must be given with the plough. A deep furrow must be made in the middle of the intervals, and the earth thrown upon the sides of the rows.

22. When the wheat is ripe, particular care must be taken, in reaping it, to trample as little as possible on the ploughed land.

23. Soon after the wheat is carried off the field, the intervals must be turned up with the plough, to prepare them for the seed. The great furrow in the middle must not only be filled, but the earth raised as much as possible in the middle of the intervals.

24. In September, the land must be again sowed with a drill, as above directed.

25. In October, the stubble must be turned in for forming the new intervals; and the same management must be observed as directed in the first year.

We pretend not to determine whether the old or new husbandry be preferable in every country. With regard to this point, the climate, the situation of particular land, skill and dexterity in managing the machinery, the comparative expence in raising crops, and many other circumstances, must be accurately attended to before a determination can be given.

The following comparative view of the old and new methods of culture, was furnished for the editors of Mr Tull’s Horse-hoeing Husbandry, by a gentleman who for some years practised both in a country where the soil was light and chalky, like that from which he drew his observations. It is necessary to remark, that in the new husbandry each article is stated at its full value, and the crop of each year is four bushels short of the other; though, in several years experience, it has equalled and generally exceeded those of the neighbourhood in the old way.

"An estimate of the expence and profit of 10 acres of land in 20 years."

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<td>Ploughing, at 6s. per acre</td>
<td>2 0 0</td>
<td>3 0 0</td>
</tr>
<tr>
<td></td>
<td>Seed, three bushels per acre, at 4s. per bushel</td>
<td>6 0 0</td>
<td>8 0 0</td>
</tr>
<tr>
<td></td>
<td>Reaping, binding, and carrying, at 6s. per acre</td>
<td>3 0 0</td>
<td>4 0 0</td>
</tr>
<tr>
<td>Second</td>
<td>Wheat, costs 111. 6s. 8d.</td>
<td>L. 5 0 s. 0 d.</td>
<td>L. 15 0 s. 0 d.</td>
</tr>
<tr>
<td></td>
<td>Weeding, at 1s. per acre</td>
<td>1 0 0</td>
<td>1 0 0</td>
</tr>
<tr>
<td></td>
<td>Seed, four bushels per acre, at 2s. 6d. per bushel</td>
<td>4 0 0</td>
<td>5 0 0</td>
</tr>
<tr>
<td></td>
<td>Cutting, raking, and carrying, at 1s. 2d. per acre</td>
<td>1 0 0</td>
<td>1 0 0</td>
</tr>
<tr>
<td>Grafs-feeds, at 3s. per acre</td>
<td>1 0 0</td>
<td>1 0 0</td>
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Third and fourth years, lying in grasses, cost nothing, so that the expence of ten acres in four years comes to 44L. 11s. 8d. and in twenty years to 222 18 4.

First years produce is half a load of wheat per acre, at 7l. 35 0 0
Second years produce is two quarters of barley per acre, at 1l. 20 0 0
Third and fourth years grasses is valued at 1l. 10s. per acre 15 0 0

So that the produce of ten acres in four years is 70 0 0
And in twenty years it will be 350 0 0
Deduct the expence, and there remains clear profit on ten acres in twenty years by the old way 127 18

II. In the new way.

First year's extraordinary expence is, for ploughing and manuring the land, the same as in the old way. L. 22 0 0

Ploughing
ARGUMENT.

Ploughing once more, at 4s.

Seed, nine gallons per acre, 2 0 0

Drilling, at 7d. per acre 0 5 0

Hand-hoeing and weeding, at 2s. 6d. per acre 1 5 0

Horse-hoeing six times, at 10s. per acre 5 0 0

Reaping, binding, and carrying, at 6s. per acre 3 0 0

The standing annual charge on ten acres 2 15 10

Therefore the expense on ten acres in twenty years is 275 16 8

Add the extraordinaries of the first year, and the sum is 297 16 8

The yearly produce is at least two quarters of wheat per acre, at 11. 8s. per quarter; which, on ten acres in twenty years amounts to 560 0 0

Therefore, all things paid, there remains clear profit on ten acres in 20 years by the new way 262 3 4

"So that the profit on ten acres of land in twenty years, in the new way, exceeds that in the old by L. 125 : 1 : 8, and consequently is considerably more than double thereof; an ample encouragement to practice a scheme, whereby so great advantage will arise from so small a quantity of land, in the compass of a twenty-one years lease; one year being allowed, both in the old and new way, for preparing the ground.

"It ought withal to be observed, that Mr Tull's husbandry requires no manure at all, though we have here, to prevent objections, allowed the charge thereof for the first year; and moreover, that though the crop of wheat from the drill-plough is here put only at two quarters on an acre, yet Mr Tull himself, by actual experiment and measure, found the produce of his drilled wheat-crop amounted to almost four quarters on an acre."

It appears also from a comparative calculation of expense and profit between the drill and common husbandry, taken from Mr Baker's report to the Dublin Society of his experiments in agriculture for the year 1765, that there is a clear profit arising upon an Irish acre of land in 15 years in the drill husbandry of L. 27 : 19 : 2; and in the common husbandry of L. 27 : 19 : 1: and therefore a greater profit in the drilled acre in this time of L. 24 : 4 : 9, which amounts to L. 1 : 12 : 34 per annum. From hence he infers, that in every 15 years the fee-simple of all the tillage-lands of the kingdom is lost to the community by the common course of tillage. In stating the accounts, from which their result is obtained, no notice is taken of fences, water-cutting the land, weeding and reap ing; because these articles depend on a variety of circumstances, and will, in general, exceed in the common husbandry those incurred by the other.

Besides, the certainty of a crop is greater in this new way than in the old way of sowing; for most of the accidents attending wheat crops, are owing to their being late sown, which is necessary to the farmer in the old way; but in the horse-hoeing method the farmer may plough two furrows whereon the next crop is to stand immediately after the first crop is. In this manner of husbandry, the land may be ploughed dry and drilled wet, without any inconvenience; and the seed is never planted under the furrow, but placed just at the depth which is most proper, that is, at about two inches; in which case it is easy to preserve it, and there is no danger of burying it. Thus the feed has all the advantage of early sowing, and none of the disadvantages that may attend it in the other way, and the crop is much more certain than by any other means that can be used.

The condition in which the land is left after the crop, is no less in favour of the horse-hoeing husbandry than all the other articles. The number of plants is the great principle of the exhausting of land. In the common husbandry, the number is vastly greater than in the drilling way, and three plants in four often come to nothing, after having exhausted the ground as much as profitable plants; and the weeds which live to the time of harvest in the common way, exhaust the land no less than so many plants of corn, often much more. The horse-hoeing method destroys all the weeds in the far greater part of the land, and leaves that part exhausted and perfectly fresh for another crop. The wheat plants being also a third part of the number at the utmost of those in the sowing way, the land is so much the less exhausted by them; and it is very evident from the whole, that it must be, as experience proves that it is, left in a much better condition after this than after the common husbandry.

The farmers who are against this method object, that it makes the plants too strong, and that they are more liable to the black or blights of insects for that reason; but as this allows that the hoeing can, without the use of dung, give too much nourishment, it is very plain that it can give enough; and it is the farmer's fault if he do not proportion his pains so as to have the advantage of the nourishment without the disadvantages. It is also objected, that as hoeing can make poor land rich enough to bear good crops of wheat, it may make good land too rich for it. But if thins should happen, the sowing of wheat on it may be let alone a while, and in the place of it the farmer may have a crop of turnips, carrots, cabbages, and the like, which are excellent food for cattle, and cannot be over-nourished: or, if this is not chosen, the land, when thus made too rich, may soon be sufficiently impoverished by sowing corn upon it in the common old way.

The method of horse-hoeing husbandry, so strongly recommended by Mr Tull, is objected to by many on account of the largeness of the intervals which are to be left behind the rows of corn. These are required to be about five feet wide; and it is thought that such wide spaces are so much lost earth, and that the crop is to be so much the less for it. But it is to be observed, that the rows of corn separated by these intervals need not be single: they may be double, triple, or quadruple, at the pleasure of the farmer; and four rows thus standing as one will have the five foot interval but one-fourth of its bigness as to the whole quantity, and it will be but as fifteen inch intervals to plants
in single rows. Corn that is sown irregularly in the common way, seems indeed to cover the ground better than that in rows; but this is a mere deception; for the stalks of corn are never so thick as when they come out of one plant, or as when they stand in a row; and a horse-hoed plant of corn will have 20 or 30 stalks in a piece of ground of the same quantity, where an unhoed plant will have only two or three stalks. If these stalks of the hoed plant were separated and planted over the intervals, the whole land would be better covered than it is in the common way; and the truth is, that though these hoed fields seem to contain a much less crop than the common fowen fields, yet they in reality do contain a much greater. It is only the different placing that makes the fown crop seem the larger, and even this is only while both crops are young.

The intervals are not lost ground, as is usually supposed, but when well horse-hoed they are all employed in the nourishment of the crop, the roots of the plants in the adjoining rows spreading themselves thro' the whole interval, and drawing such nourishment from it, that they increafe accordingly. When the plants stand in the scattered way, as in common fowing, they are too close to one another; each rob its neighbours of part of their nourishment, and consequently the earth is soon exhausted, and all the plants half starved. The close fanding of them also prevents the benefit of after­tilling, as the hoe cannot be brought in, nor the ground by any means stirred between them to give it a new breaking, and consequently afford them new food.

Experiments have abundantly proved, that in large grounds of wheat where the different methods have been tried, those parts where the intervals were large have produced the greatest crops, and those where hoeing was used without dung have been much richer. Than where dung was used without hoeing. If it were poffible that plants could fand as thick, and thrive as well over the whole surface of the ground, as they do in the rows separated by thefe large intervals, the crops of corn for produced would be vastly greater than any that have been heard of; but the truth is, that plants receive their growth not according to the ground they fand on, but to the ground they can extend their roots into; and therefore a single row may contain more plants than a large interval can nourifh, and therefore the fame number that fand in that row, and no more than thofe, could be nourifh'd, if fattered over the whole interval; and they would be much worfe nourifh'd in that way; because while the interval is void, the earth may be ftrirred about them, and new roots will be formed in great numbers from every one broken by the instruments and new nourifhment laid before these roots by the breaking the particles of earth, by which the plants will have supplies that they cannot have when fattered over the whole surface, because the ground is then all occupied, and cannot be moved between the plants.

All foils and all situations are not equally proper for this method of planting in rows with large intervals and hoeing between. The lightest foils ferve to be best for it, and the rough and wet clays the worft. Such grounds as lie on the sides of hills are also less proper than others for this work.

This method is not fo proper in common fields, but that not in respect of the foil, but of the husbandry of the owners, whofe usually in the old way, and change the species of corn, and make it necessary to fallow every second, third or fourth year. Nevertheless it has been founded by later experiments, that the intervals between the rows of plants, as recommended by Mr Tull, were too great, perhaps double of what they should be in the most profitable method of culture; by which means much less crops are obtained than might be produced at nearly the fame expense. This has rendered the profits of the drill method much less than they would have been in a more judicious practice, and, consequently, has proved a great disadvantage to it in comparison with the broad-caft. Mr Tull was led into this, partly from the want of more perfect instruments for hoeing, and of ploughs proper for drilling.

To the preceding statements, the following observations by Sir John Attifrucher, published among the Select Papers of the Bath Society, may not be improperly subjoined.

The fowen process which the drill-husbandry has Observ­made in many parts of Great Britain since Mr Tull's time, he observes, has been principally owing to the John A newwant of proper drill-ploughs. Before drilling can be­ come general, these ploughs muft be simple, fuch as a common ploughman accustomed to ufe frong instru­ments can ufe without breaking, and fuch also as com­mon workmen can easily make or repair. Mathematical accuracy he considers as not required for delivering the feed: for it matters very little whether there be a quarter of a peck more or fefs fown, if it be deli­vered with tolerable regularity. He therefore had a plough made, according to his own directions, by a common plough-wright, of fufficient strength for any land made fit for turnips or wheat. It was tried on very rough ground unfit for fowing, in order to acf­tain its strength; and it had been ufed for eighteen years without its needing any repair. It is a double drill­plough, which fows two ridges at a time, the horse going in the furrow between them, and of courfe does not tread upon the ground intended to be fawn; which with a fingle drill-mufi be the cafe, and does much harm by the horfes feet sinking and making holes in the fine ground, which retain the water, and hurt the wheat when young.

He proceeds to obferve, "That having read Mr Forbes upon the extensive practice of the new husbandry, and some other authors, who gave a more clear and definite account of the different operations in drill­ing than had herefore been given, I wished to try them, and to adapt my plough to fow the quantities therein directed. It was, however, adjusted to fow a smaller quantity, and the feed was not fpeeled.

"Not having ground fo proper as I wished, it was dril­led on the fide of a field, the foil of which was light and fandy, and in fuch bad order, that the preceding crop was a very indifferen't one. It was therefore man­ured with a compoft dung-hill.

"After cros-ploughing and manuring, it was laid into four and a half feet ridges, then harrowed and drilled with one peck and a half of wheat on an acre and a quarter, which is nearly one peck and a fifth per English acre. It was dril­led the 27th of October, and rolled after drilling. The crop was late in its appearance, and very backward in the spring."


A G R I C U L T U R E.

Part II.

March 31st, it was horse-hoed one furrow from the rows.

April 8th, it was hand-hoed and weeded in the rows.

25th, horse-hoed again, laying a furrow back to the rows.

May 15th, hand-hoed the second time.

June 1st, horse-hoed from the rows.

July 14th, horse-hoed to the rows.

At this last hoing, as many of the carts were beaten down into the intervals by wind and rain, a man went before the horse-hoe, and turned the ears back

bufhels and such dung.

found to be right. But

The land adjoining was sown with beans and peas, which were a good advantage without manure.

As the produce appeared so great, from land in such bad order, it was carefully measured again, and known to be right. But this increase, though great, was not so large as Mr. Crake of Glasgow had without dung.

Mr. Randal says, *It is an experimented fact, that on a fine loam excellently prepared, 144 bushels have been produced from one acre. And, I believe, it is not known what the increase may be brought to in rich land by high cultivation.*

Some years since, I had beans dropt alternately with potatoes, at two feet distance in the rows, which were three feet apart, and ploughed in the intervals. The land adjoining was sown with beans and peas, which were a good crop; but those towns among the potatoes a better one. I pulled one stem of the beans planted with the potatoes, which had three branches rising from the bottom, and it produced 225 beans. In all the trials of drilled beans, most of the stems had two branches, with many pods upon each. From these and other instances, I believe it is not yet known to what increase grain may be brought by drilling, good cultivation, and manure.

Horse-hoeing is certainly preferable to close drilling or hand-hoeing; but the latter is superior to broadcast.

Horse-hoeing the full depth increases the crop, by making it tiller or branch more than it otherwise would do; and the advantage is distinctly observable every hoeing, by the colour of the grain. It prepares the ground for the next crop, at the same time that it increases the crop growing, which hand-hoeing does not, although it may destroy the weeds. Thus drilled ground is kept in a loose open state, to receive the benefit of the influence of the air and weather, which broadcast has not; and it is evident, from certain experience, that crops may be drilled many years to good advantage without manure.

Suppose the crops only 20 bushels per acre, what course of broadcast crops will give 51. an acre for the course? But suppose they are dunged the same as any ground in the most approved course, there is the greatest reason to expect as much as in the above experiment, which is 28 and three-quarters, and at 5s. per bushel amounts to 71. 3s. 9d.

Calculations may be of service to those who wish to try drilling, and have few books to direct them.

*One acre is 10 chains long, of 660 feet, or 220 yards long, and one yard broad, containing 4840 square yards. Then if the ridge is four feet six inches, this makes 14 ridges, and three feet to spare. This length of 220 yards, multiplied by 14 (the number of ridges) gives a length of yards 3080, to which add 146 for the spare three feet, and it will be 3226 yards. And as two rows are drilled on a ridge, the number of rows will be in length 6452 yards; but as a deduction of 172 yards must be made for the head ridges, suppose three yards each, &c. The whole length to be sown will be 6280 yards clear. Now a gallon (Winchester) holds about 80,000 grains. The quantity recommended to be drilled by Mr. Forbes and others, being six gallons, or two-thirds of a bushel per acre, is nearly 78 grains to a yard, or 26 to a foot. But in my experiment, by this calculation, it was only about 11 grains to a foot; which is quite sufficient, if the feed be good, and it be not destroyed by vermin.*

Now with regard to the quantity of land this drill-plough may sow, if a horse walks at the rate of two miles per hour, he goes 16 miles in eight hours, or 28,460 yards. As he sows two ridges at once, this is seven lengths and two-thirds per acre, or 1686 yards to sow an acre, being nearly 17 acres in a day.

Four horse-hoeings are calculated equal to two ploughings. In plain ploughing they suppoze the ridge is ploughed with four furrows, or eight for twice ploughing. The four horse-hoeings are eight furrows, equal to two ploughings.

Mr. Tull directs four hoeings, and Mr. Forbesfive. First, in November, when the plant has four blades. 2dly, in March, deep, and nearer the rows than the former; both these hoeings should be from the rows. 3dly, Hand-hoed when it begins to spindel, if the earth be crumbly, to the rows. 4thly, When it begins to blossom, from the rows, but as near to them as in the second hoing. 5thly, When done blooming, to ripen and fill the grain, to the rows.

The night hoeing Mr. Tull does not direct, but Mr. Forbes advises it, as being of essential service in filling the grain, and saving trouble in making the next feed-furrows. They advise the patent or sowing-plough for horse-hoeing; and the expense is calculated by Mr. Crake at one guinea per acre, reaping included.

*But let us suppoze the following, which are the prices in the country I live in (Fife).*

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<thead>
<tr>
<th>L.</th>
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<tbody>
<tr>
<td>Ploughing to form the ridges,</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Harrowing,</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Four hoeings, equal to two ploughings,</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Sowing,</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Hand-hoeing twice,</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Seed, one peck and a half, at 5s. a bushel,</td>
<td>1</td>
<td>10</td>
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Whole expense per acre, | - | 1 | 2 | 6 |

Drill husbandry is, as a good writer has justly defcrib'd, *the practice of a garden brought into the field.*

Every man of the least reflection must be sensible, that the practice of the garden is much better than that of the field, only a little more expensive; but if (as is the case in the most particular farms) this extra expense be generally much more than repaid by the superior goodness and value of drilled crops, it ought to have no weight in comparing the two modes of husbandry.
In the broadcast method the land is often sown in bad tilth, and always scattered at random, sometimes by very unskilful hands. In drilling, the land must be in fine order; the seed is set in trenches drawn regularly, all of nearly an equal depth, and that depth suited to the nature of each kind of seed. These seeds are also distributed at proper distances, and by being equally and speedily covered, are protected from vermin and other injuries; so that the practice of the garden is here exactly introduced into the field.

In the broadcast method the feed falls in some places too thick, in others too thin; and being imperfectly covered, a part of it is devoured by vermin which follow theower: another part is left exposed to rain or frost, or to heats, which greatly injure it. When harrowed, a great part of it (small seeds especially) is buried too deep, that if the soil be wet, it perishes before it can vegetate.

Again: When thus sown there is no meddling with the crop afterwards, because its growth is irregular. The soil cannot be broken to give it more nourishment, nor can even the weeds be destroyed without much inconvenience and injury.

But in the drill-husbandry the intervals between the rows, whether double or single, may be handled; and thereby nourishment may repeatedly be given to the plants, and the weeds almost totally destroyed.

The very same effects which digging has upon young flubs and trees in a garden, will result from horse-hoeing in a field, whether the crop be corn or pulse:

For the reason of the thing is the fame in both cafes, and being founded in nature and fact, cannot ever fail.

In drilling, no more plants are raised on the soil than it can well support; and by dividing and breaking the ground they have the full advantage of all its fertility.

The plough prepares the land for a crop, but goes no further; for in the broadcast husbandry it cannot be used: but the crop receives greater benefit from the tillage of the land by the horse-hoe, while it is growing, than it could in the preparation. No care in tilling the land previous to sowing can prevent weeds rising with the crop; and if these weeds be not destroyed while the crop is growing, they will greatly injure it. In the broadcast husbandry this cannot be done, but in drilling, the horse-hoe will effect it easily.

And what adds to the farmer’s misfortune is, that the most pernicious weeds have roots winged with down, which are carried by the wind to distant distances; such are thistles, sow-thistles, clover-foot, and some others.

If the expense of horse-hoeing be objected, there are two answers which may very properly be made: The first is, that this expense is much less than that of hand-hoeing were it practicable, or of hand-weeding. The second is, that it is more than repaid by the quantity of seed saved by drilling; to say nothing of the extra quantity and goodness of the crops, which are generally self-evident.

Upon the whole: If the particular modes of cultivating land by the new husbandry should, after all, be considered as perhaps too limited to be universally adopted; yet it has been of great use in raising sufficient concerning the old method, and in turning the views of philosophers and farmers towards improving in general. Many real improvements in agriculture have been the consequences of these sufficiencies; and as this spirit of inquiry remains in full vigour, a solid foundation is laid for expecting still further improvements in this useful art.
A GRIGENTI, speedily back to their old connections. But as if it had been decreed that all friendship should be fatal to their repute, the reconciliation and its effects drew up on the anger of the Carthaginians. By this enemy their cities were routed, their city taken, their race almost extirpated, and scarce a vestige of magnificence was left. Agrigentum lay 50 years buried under its own ruins; when Timoleon, after triumphing over the Carthaginians, and restoring liberty to Sicily, collected the descendants of the Agrigentines, and sent them to re-establish the dwellings of their forefathers. Their exertions were rewarded with astonishing success; for Agrigentum rose from its ashes with such a renewal of vigour, that in a very short time we find it engaged in the bold scheme of feizing a lucky moment, when Athagocles and Carthage had reduced Syracuse to the lowest ebb, and arrogating to itself supremacy over all the Sicilian republics. Xenodicus was appointed the leader of this arduous enterprise; and had his latter operations been as fortunate as his first campaign, Agrigentum would have acquired such a preponderance of reputation and power, that the rival states would not even have dared to attack it. But a few brilliant exploits were succeeded by a severe overthrow; the Agrigentines loft courage, disagreed in council, and humbly sued for peace when he left Sicily to the mercy of her enemies, a period very little mention of it occurs in the history, nor do we know the precise time of the Saracens. The principal part of the ancient city lay in the vale; the present town, called Girgenti, occupies the mountain on which the citadel of Coeclus stood. It was difficult to be more judicious and fortunate in the choice of situation for a large city. The inhabitants were here provided with every requisite for defence, pleasure, and comfort; a natural wall, formed by abrupt rocks, prevented a strong barrier against intruders; pleasant hills sheltered them on three sides without impeding the circulation of air; before them a broad plain watered by the Acragas, gave admissitance to the sea-breeze, and to a noble prospect of that awful element; the port or emporium lay in view at the mouth of the river, and probably the road across the flat was lined with gay and populous suburbs. The hospitality and parade for which the Agrigentines are celebrated in history were supported by an extensive commerce: by means of which, the commonwealth was able to reift many shocks of adversity, and always to rise again with fresh splendour. It was, however, crushed by the general fall of Grecian liberty; the feeble remnants of its population, which had survived so many calamities, were at length driven out of its walls by the Saracens, and obliged to lock themselves up for safety among the bleak and inaccessible rocks of the present city. At the north-east angle of the ancient city, upon some foundations of ancient regular stones, a church has been erected; a road appears hewn in the solid rock for the convenience of the votaries that visited this temple in ancient days. It was then dedicated to Cerers and her daughter Proserpine, the peculiar patronesses of Sicily. Bishop Blafse has succeeded to their honours. At the fifth-east corner, where the ground, rising gradually, ends in a bold eminence, which is crowned with majestic columns, are the ruins of a temple said to have been consecrated to Juno. To the west of this, stands the building commonly called the Temple of Concord; the stone of which, and the other buildings, is the fame as that of the neighbouring mountains and cliffs, a conglutination of sea-land and shells, full of perforations, of a hard and durable texture, and a deep reddish brown colour. This Doric temple has all its columns, entablature, pediments, and wall entire; only part of the roof is wanting. It owes its preservation to the piety of some Christians, who have covered half the nave, and converted it into a church consecrated under the invocation of St Gregory, bishop of Girgenti. Proceeding in the same direction, you walk between rows of sepulchres cut in the rock wherever it admitted of being excavated by the hand of man, or was so already by that of nature. Some mafles of it are hewn into the shape of coffins; others drilled full of small square holes employed in a different mode of interment, and serving as receptacles of urns. One ponderous piece of the rock lies in an extraordinary position; by the failure of its foundation, or the shock of an earthquake, it has been loosened from the general quarry, and rolled down the declivity, where it now remains upright with the cavities turned upwards. Only a single column marks the confufed heaps of mofs-grown ruins belonging to the temple of Hercules. It flows on a projecting rock above a chasm in the ridge, which was cut through for a passage to the emporium. In the same track, over some hills, is founded the building usually called the tomb of Thero. It is surrounded by aged olive-trees, which cast a wild irregular shade over the ruin. The edifice inclines to the pyramidal shape, and consists at present of a triple pilum and a base supporting a square pedestal: upon this plain solid foundation is reared a second order, having a window in each front, and at each angle two Ionic pilasters crowned with an entablature of the Doric order. Its inside is divided into a vault, a ground room, and one in the Ionic style, communicating with each other by means of a small internal staircase. In the plain are seen the fragments of the temple of Ecualius; part of two columns and two pilasters, with an intermediate wall, support the end of a farmhouse, and were probably the front of the cells. Pursuing the track of the walls towards the west, you arrive at a spot which is covered with the gigantic remains of the temple of Jupiter the Olympian, minutely described by Diodorus Siculus. It may literally be said that it has not one stone left upon another; and it is barely possible, with the help of much conjecture, to discover the traces of its plan and dimensions. Diodorus
AGRIMONY (Agrimonia) is a genus of the dicinga order, belonging to the dodecandra clafs of plants, and in the natural method ranking under the 35th order, Senticeae. The characters are thefe: The calyx is a monophyllous perianthium, divided into five acute fragments, perifcent, and fcccaded with another calyx: The corolla consists of five petals, flat, and cre­nated at the ends: The faminae have ten capillary tils­ments, shorter than the corolla, and inferted into the calyx; the anthers are small, didymous, and compre­fled; the stigminas have a germcn beneath; the flfli are two, fimple, and the length of the flamina: There is no pericarpium; the calyx is contracted in the neck, and indurated: The feeds are two, and roundish. Of this genus there are five fpecies enumerated by botani­
cal writers; but none of them have any remarkable Agrimony properties except the two following.

Species and properties. 1. The eupatoria, or com­mon agrimony, grows naturally in several parts of Brit­ain by the sides of hedges and of woods. It is much of a usual occafiion, but when fed with bread and wine. The Canadians are said to have known the inftation of the root in burning furners with great success. An infiuation of six ounces of the crown of the root in a quart of boiling water, sweetened with honey, and if a pint of it drank three times a-day, is an effectual cure for the jaundice, according to Dr Hill. He advifes to begin with a vomit, afterwards to keep the belly soluble, and to continue the medicine as long as any symptoms of the difeafe remain. It is said to be an aperient, detefier, and strengthener of the vifera.

Hence it is recommended in fcroburn disoders, in de­bility and laxity of the interines, &c. Digefed in whey, it affords an ufeful diet-drink for the spring­feafon, not ungrateful to the palate or stomac h. Doc­tor Allton fays, that the beft mode of adminiftering this herb is in powder, when the intention is to cor­rororate; and that if thus taken in a large quantity, we may expect many of the eftects of the bark from it in agues.

2. The odorata, or sweet-feented agrimony. This grows near four feet high; the leaves have more pinea than the former; the ferratures of the leaves are also sharper, and, when handled they emit an agreeable odour. The leaves of this fpecies make an agreeable cooling tea, which is fometimes preferred by phy­ficians as a drink for people in fevers.

Culture. Both offe fpecies may be propagated ei­ther by seed, or by parting the roots in autumn when the leaves begin to decay. The seeds ought alfo to be fown in this feafon; for if kept out of the ground till spring, they seldom come up that year.—Agrimony is a hardy perennial plant, and will thrive in almost any foil or fitation; but the plants should not be placed nearer one another than two feet, that the roots may have room to spread.

HEMP Agrimony. See Eupatorium.

WATER HEMP. Agrimonia. See Byrns.

AGRIONIA, in Grecian antiquity, feiftivals an­nually celebrated, by the Borotians, in honour of Bacchus. At thofe feiftivals, the women pretended to fearch after Bacchus as a fugitive; and, after some time, gave over their inquiry, faying, that he was fed to the Mufes, and was concealed among them.

AGRIOPHAGI, in antiquity, a name given to thofe who fed on wild beafis. The word is Greek, compounded of agrion "wild," "favage," and opho- "I eat." The name is given, by ancient writers, to certain people, real or fabulous, faid to have fed alo­gether on lions and panthers. Pliny and Solinus speak of Agriophagi in Ethiopia, and Pol每位 of others in India on this fide the Ganges.

AGRIPPA, in midwifery, a term applied to chil­dren, brought forth with their feet foremost.

AGrippa (Herod), the fon of Arifobulus and Mariamne, and grandson to Herod the Great, was born in the year of the world 3997, three years before the birth of our Saviour, and seven years before the vulgar era. After the death of Arifobu­
us his father, Josephus informs us, that Herod his
grandfather took care of his education, and sent him
to Rome to make his court to Tiberius. The
emperor conceived a great affection for Agrippa, and
placed him near his son Drusus. Agrippa very soon
won the graces of Tiberius, and of the emperor An-
tonia. But Drusus dying suddenly, all those who
had been much about him were commanded by Tibe-
rius to withdraw from Rome, lest the sight and pref-
ce of them should renew his affliction. Agrippa,
who had indulged his inclination to liberality, was ob-
liged to leave Rome overwhelmed with debts, and in
a very poor condition. He did not think it fit to go
to Jerusalem, because he was not able to make a figure
there suitable to his birth. He therefore went to
Rome to take his freedom, and presented himself
and grandson of Antonia, who had married Herodias
for some time with great generosity. He made him
of Agrippa; so that Herod
had accepted of the charge of historiographer to the empe-

rator.

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A Gr [329]

AGRIPPINA, daughter of Germanicus, sister of Caligula, and mother of Nero, a woman of wit, but excessively lewd. She was twice married, the last time to Claudius her own uncle; whose the prompting to make way for Nero her son, Nero afterward caused her to be murdered in her chamber, when the bid the executioner flab her first in the belly that had brought forth such a monster.

AGrippina colonia urborum (anc. geog.), now Cologne: so called from Agrippina, the daughter of Germanicus, and mother of Nero, who had a colony set thither at her request by the emperor Claudius, to the place of her birth. See Cologne.

AGrippinians, in church-history, the followers of Agrippina bishop of Carthage, in the third century, who first introduced and defended the practice of re-baptism.

AGROM, a disease frequent in Bengal and other parts of the Indies, wherein the tongue chaps and cleaves in several places, being extremely rough, and sometimes covered with white spots. The Indians are very fearful of this disease, which they attribute to extreme heat of the stomach. Their remedy is, to drink the juice of mint.

AGrostema, Wild Lynchis, or Campion: A genus of the pentagynia order, belonging to the dendrania class of plants; and in the natural method ranking under the 22d order, Caryophyllis. The characters are: The calyx is a single-leaved perianthium, leathery, tubular, quinquedentated, and pellucid. The corolla consists of five ungulate petals: The flamina has ten filiform filaments; the anthers are simple: The pistillum has an egg-shaped germenis; the style are five, filiform, erect, and the length of the flamina. The filaments are simple: The pericarpium is an oblong covered capsule, having two cells and five valves: The seeds are numerous and kidney-shaped; the receptacula are as many as the seeds, the interior ones gradually longer.

Species. The most remarkable are, 1. The githago, hairy wild lychins, or common campion, which grows naturally in corn-fields in most parts of Britain. The flowers appear in June, are generally purple, sometimes white, and by cultivation yellow.

2. The coronaria, or single-robe campion. Of this species there are four varieties; one with deep red, another with white, another with purple, and a third with white flowers; and a fort with double flowers, which has turned most of the others out of the gardens.

3. The flos jovis, or umbelliferous mountain-campion, grows naturally upon the Helvetican mountains. It is a low plant with woolly leaves: the flower-flum rifes near a foot high; the flowers grow in umbels on the top of the stalk, and are of a bright red colour. They appear in July, and the seeds ripen in September.

Culture. The first and third species are annual plants, so must be propagated by seeds; but as the first is found naturally in corn-fields, it is very seldom cultivated in gardens; the third sort should have a shady situation, and thrives best in a strong soil. The second species is perennial, but only those varieties which have double flowers produce any seeds; the double kind, therefore, as it produces no seeds, must be propagated by parting the roots in autumn, after the flowers are past. In doing this, every head which can be clipped off with roots should be parted; these should be planted in a border of fresh, unturned earth, at the distance of six inches one from the other, observing to water them gently until they have taken root; after which they will require no more; for much wet is very injurious to them, as is also dung. In this border they may remain till spring, when they should be planted in the borders of the flower-garden, where they will be very ornamental during the time of their flowering, which is in July and August. This plant is cat by hores, goats, and sheep.

AGrostis, Bent-grass, in botany: A genus of the eriogonum order, belonging to the digynia class of plants; and, in the natural method, ranking under the 4th order, Gramina. The characters are: The calyx is a one-flowered, two-valved, pointed gluma, rather less than the corolla. The corolla is two-valved and pointed. The flaminae have three capillary filaments, which are larger than the corolla. The anthere are forked. The pistillum has a roundish germenis; the style are two, reflected, and villous: the stigma bifid longitudinally. The pericarpium is the corolla growing to the seed, not gaping. The seed is one, globular, and pointed at both ends. There are 15 species; eight of them natives of Britain.

AGrostographia, signifies the history or description of grasces. See Grass.

Agrround, the situation of a ship whose bottom, or any part of it, hangs, or rests upon the ground, so as to render her immovable, till a greater quantity of water floats her off, or till ice is drawn out into the stream by the application of mechanical powers.

AGryphia, among physicians, implies an inaptitude to sleep, a troublesome symptom of feverish and other disorders.

AGYPhia, in the Greek church, implies the vigil of any of the greater festivals.

Agu, a general name for all periodical fevers, which, according to the different times of the returns of the six cold paroxysms, are denominated tertian, quartan, and quinquat; See Medicine (Index).

Agu-Gate, the popular name for a hard tumour on the left side of the belly, lower than the falle ribs, said to be the effect of intermitting fevers.

Agu Tree, a name given to the fatasfars, on account of its febrifuge qualities.

Agüéprise, a town of France, situated on the Rhone, about 15 miles north of Clermont.

Aguillaneuf, or Aguillaneuf, a form of rejoicing used among the ancient Franks on the first day of the year. The word is compounded of the French A"cro" guu" millet," and I'an neuf "the new year." Its origin is traced from a druid-ceremony: the priests used to go yearly in December, which with them was reputed a sacred month, to gather millet of the oak, and throw it in great solemnity. The prophets marched in the front, singing hymns in honour of their deities.
A G U

AGURAH, in Jewish antiquity, the name of a Agurah, silver coin, otherwise called gorah and keseitha.

AGURIM, or AGERVUM (anc. geogr.), a town of Sicily in the Val di Demona, near the river Semtau. The people were called Populai Argeriam and Agurina by Pliny. It was the birth-place of Diodorus Siculus, as he himself testifies; but he calls Agryrum, as it is now called S. Filippo d'Agirone, which modern name seems to confirm that Agryrum is the true reading.

AGUSADURA, in ancient customs, a fee due from vassals to their lord for the harpooning their ploughing tackle. Anciently the tenants in some manors were not allowed to have their rural implements harpooned by any but whom the lord appointed; for which an acknowledgment was to be paid, called Agusadura, in some places Agysage: which some take to be the same with what was otherwise called Reillage, from the ancient French reille, a ploughshare.

AGUTT, in zoology, the trivial name of a species of the mole, belonging to the mammalia grises of Linnæus. See Mus.

AGYEI, in antiquity, a kind of obelisks, sacred to Apollo, erected in the vestibule of houses, by way of security.

AGYNIANI, in church-history, a sect who condemned all use of flesh, and marriage, as not instituted by God, but introduced at the instigation of the devil. The word is compounded of the privative ene and woman. They are sometimes also called Agynenfer, and Agynos, and are said to have appeared about the year 694. It was no wonder they were of no long continuance. Their tenets coincide in a great measure with those of the Abellians, Gnostics, Cerdonians, and other preachers of chaffity and abstinence.

AGYRTA, in antiquity, a kind of strolling impostors running about the country, to pick up money by telling fortunes at rich men's doors, pretending to cure diseases by charms, sacrifices, and other religious mysteries; also to expiate the crimes of their deceased ancestors, by virtue of certain oaths and fummonages; to torment their enemies, by the use of magical verbes and the like. The word is Greek a gynaie, formed of the verb a gynen, I congregate; alluding to the practice of Charletons, who gather a crowd about them.

AGYRTA, among the Greeks, amount to the same with Ersercatere among the Latins, and differ not much from Gypsies in Britain.

AHAB, son of Omri, king of Israel, succeeded his father A. M. 3086, and surfeited all his predecessors in iniquity and wickedness. He married Jezebeth the daughter of Ethbaal king of the Sidonians, who introduced the idols of Baal and Ashtore among the Israelites, and engaged Ahab; in the worship of these false deities. God, being provoked by the sins of Ahab, sent the prophet Elijah to him (1 Kings xvii. 1, seq.) who declared to him, that there would be a famine of three years continuance. The dearth having lasted three years, the prophet defied Ahab to gather all the people to mount Carmel, and with them the prophets of Baal: when they were thus assembled, Elijah cawed fire from heaven upon his sacrifice, while all which he offered of God that it should rain; and then the earth recovered its former fertility.

Six years after this, Ben-hadad king of Syria (chap. [XX. .

AGUILAR, a town of Spain, in the province of Navarre, about 24 miles west of Estella. Aguilarr Del Campo, a town of Old Castile, with the title of marquifate, about 15 leagues north of the city of Burgos.

AGUILONIUS (Francis), a Jesuit, born at Brussels; he was rector of the Jesuits college at Antwerp, and eminent for his skill in mathematics. He was the first who introduced that science among the Jesuits in the low countries: he wrote a book of Optics, and was employed in finishing his Optics and Dioptrics, when death prevented him in 1617.

AGUIRA (Joseph Senez de), a Benedictine, and one of the most learned men in the 17th century, was born March 24, 1630. He was censor and secretary of the supreme council of the inquisition in Spain, and interpreter of the scriptures in the university of Salamanca. He printed three volumes in folio upon Philology, a commentary upon Aristotle's ten books of Ethics, and other pieces. He died at Rome Augut 19, 1699.

AGUL, in botany, a synonyme of the hedyarum. See HEDYARUM.

AGUR. The xxxth chapter of the Proverbs begins with this title: "The words of Agur, the son of Jakeh," which, according to the signification of the original terms, may be translated, as the Vulgate has it, Verba congregantis, filii comomens; which translation Le Clerc condemns, supposing these to be proper names, which ought not to be translated. These words are rendered by Lewis de Dieu: "The words of him who has recollected himself, the son of obedience." The generality of the fathers and commentators will have it, that Solomon describes himself under the name of Agur the son of Jakeh; others conjecture that Agur, as well as Lemuel (in chap. xxxi. 1.) were wise men who lived in the time of Solomon, and were his interlocutors in the book of Proverbs; an opinion which F. Calmet thinks is without the least shew of probability, this book being nothing like a dialogue. This last expeditor thinks it probable, that Agur was an inspired author different from Solomon, whose sentences it was thought fit to join with those of this prince, because of the conformity of their matter.

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...xx.) laid siege to Jerusalem... But God, provoked at this proud Syrian, sent a prophet to Ahab, not only to assure him a victory, but to instruct him likewise in what manner he was to obtain it. Ahab was ordered to review the princes of the provinces, which he found to be a choice company consisting of 232 young men, who were to command the people in Samaria, amounting to about 7000 men: with this small army Ahab was directed to fall upon the great host of the Syrians, and that at noon-day, while Ben-hadad and the 32 kings that accompanied him were drinking and making merry. Ben-hadad having notice that they were marching out of the city, ordered them to be brought before him alive, whatever their designs were: but the young men, followed by this small army, advanced, and killed all that opposed them, such a panic seized the Syrian troops, that they began to fly; and even Ben-hadad himself mounted his horse and fled with his cavalry; which Ahab perceiving, pursued them, killed great numbers of them, and took a considerable booty. After this the prophet came to Ahab...
AHAZ, the son and successor of Ahab king of Israel, reigned two years, part alone and part with his father Ahab, who ordained him his associate in the government a year before his death. Ahaaz initiated his father's impieties (1 Kings xxii. 52, seq.), and paid his adoration to Baal and Ashtar, the worship of whom had been introduced in Israel by Jezebel his mother. The Moabites, who had been always obedient to the kings of the ten tribes ever since their separation from the kingdom of Judah, revolted after the death of Ahab, and refused to pay the ordinary tribute. Ahaaz had not leisure or power to reduce them (2 Kings i. 1, 2, &c.); for about the same time, the prophet Elijah went to Ahaaziah, and declared to him the evil that the Lord had declared he would bring upon his house for his impieties; but the prince, upon hearing the sound of her feet, said, "Come in, thou wife of Jeroboam, why feignest thou thyself to be another? for I am sent to thee with heavy tidings." Then he commanded her to go and tell Jeroboam all the evil that the Lord had declared he would bring upon his house for his impieties; that soon as she should enter into the city her son Ahaaziah should die, and should be the only one of Jeroboam's house that should come to the grave or receive the honours of a burial. Ahaaziah in all probability did not long survive the time of this last prophecy; but with the time and manner of his death we are not acquainted.

AHITOPHEL, a native of Gilo, was for some time the counsellor of king David, whom he at length deserted, by joining in the rebellion of Absalom. This prince, upon his being preferred to the crown by the greatest part of the Israelites, sent for Ahitophel from Gilo (2 Sam. xv. 12.), to assist him with his advice in the present state of his affairs: at that time Ahitophel's counsels were received as the oracles of God himself (chap. xvi. 4.). Nothing gave David more uneasiness than this event; and when Hushai his friend came to wait on him and attend him in his flight, he intreated him to return rather to Jerusalem, make a shew of offering his services to Absalom, and endeavour to frustrate the prudent measures which should be proffered by Ahitophel. When Absalom was come to Jerusalem, he desired Ahitophel to deliberate with his other counsellors upon the measures which were proper for him to take. Ahitophel advised him in the first place to abate his father's concubines; so that when his party should understand that he had dishonoured his father in this manner, they might conclude that there were no hopes of a reconciliation, and therefore eschew his interest more resolutely. A tent, therefore, being prepared for this purpose upon the terrace of the kings palace, Absalom, in the sight of all Israel, lay with his father's concubines. The next thing Ahitophel proposed was in the terms following: "Let me now choose out 12,000 men, and I will arise and pursue after David this night, and I will come upon him while he is weary and weak-handed, and I will make him..."
Ahu (chap. viii.) to march with the whole army of the Israelites against Ai, and treat this city and the kingdom thereof as he had treated Jericho, with this difference, that he gave the plunder of the town to the people. Joshua sent by night 30,000 men to lie in ambush behind Ai; having first well instructed those who had the command of them in what they were to do; and the next day, early in the morning, he marched against the city with the remainder of his army. The king of Ai perceiving them, fellied hastily out of the town with all his people, and fell upon the forces of the Israelites; who upon the first onset fled, as if they had been under some great terror.

As soon as Joshua saw the enemy all out of the gates, he raised his shield upon the top of a pike, which was the signal given to the ambush; whereupon they immediately entered the place, which they found without defence, and set fire to it. The people of Ai perceiving the smoke ascending, were willing to return, but discovered those who had set fire to the city before their rear, which had happened under the influence of Hushai's advice, and was determined to prevent the death which he had deserved, and which David would probably have inflicted on him, as soon as he should be reftitted on his throne.

Ahmella, in botany. See Bidens.

Aholibah and Aholah, are two feigned names made use of by Ezekiel (xxiii. 4.) to denote the two kingdoms of Judah and Samaria. Aholah and Aholibah are represented as two sisters of Egyptian extraction. Aholah flands for Samaria, and Aholibah for Jerusalem. The first signifies a tent; and the second, my tent is in her. They both prostituted themselves to the Egyptians and Assyrians, in imitating their abominations and idolatries: for which reason they were abandoned to those very people for whom they had shown so passionate and so impure an affection; they were carried into captivity, and reduced to the severest servitude.

Ahouai, in botany, a synonyme and also the trivial name of the species of Cerbera.

A-hull, in the sea-language, the situation of a skiff, for her fish are fished on account of the violence of the wind, and when having lathed her helm on the lee-tide, the lies nearly with her side to the wind and sea, her head being somewhat inclined to the direction of the wind.

Ahun, a town in France, in the Upper Marche and generality of Moulins, and is a royal jurisdiction. It is treated on the river Creufe, near a Benedictine abbey of the same name, eight miles south-east of Gueret, 50 north-east of Lomages, and 55 south-east of Moulins. E. Long. 2. 8. N. Lat. 49. 5.

Ahuy, a town of Sweden. It is small, but very strong by its situation, and has a good port. It is in the principality of Gotland, in the territory of Blekingy, near the Baltic sea, about 18 miles from Christianstad. E. Long. 14. 10. N. Lat. 56. 20.

Ai, (anc. geog.) a town in Judaea, to the north of Jericho, called Arz by Jophusas, and the inhabitants Anatar. Joshua having sent a detachment of 3000 men against Ai, God permitted them to be repulsed on account of Achan's sin, who had violated the anathema pronounced against the city of Jericho. But after the expiation of this offence, God commanded Joshua
AICUROU fed on several sorts of commodities, especially wine.

The governor's inner leg, inner rein, failed, wherein the Greeks had given the preference in his treatise of Dancing, and used to avoid the necessity of corrections. The inner heel, inner leg, outer rein, &c. are called inner aids; as the outer heel, outer leg, outer rein, &c. are called outer aids.

AIDS, in the French customs, certain duties paid on all goods exported or imported into that kingdom. Court of AIDS, in France, a sovereign court established in several cities, which has cognizance of all causes relating to the taxes, gabelles, and aids, imposed on several sorts of commodities, especially wine.

Ajans, in the manage are the same with what some writers call sheriffs, and used to avoid the necessity of corrections. The inner heel, inner leg, outer rein, &c. are called inner aids; as the outer heel, outer leg, outer rein, &c. are called outer aids.

AIDAN, a famous Scotch bishop of Lindisfarne, or Holy Island, in the 7th century, was employed by Oswald king of Northumberland in the conversion of the English, in which he was very successful. He died in 617.

AIGHENEDALE, the name of a liquid measure used in Lancashire, containing seven quarts.

AIGLE, a bailiwick in the territory of Romand, consists of mountains and valleys, the principal of which are the Aigle and Bex. Through these is the great road from Vaillais into Italy. When you pass by Villeneuve, which is at the head of the lake of Geneva, you enter into a deep valley three miles wide, bordered on one side by the Alps of Switzerland, and on the other with the shores of Savoy, and crossed by the river Rhone. Six miles from thence you meet with Aigle, a large town, seated on a wide part of the valley, where there are vineyards, fields, and meadows. The governor's castle is on an eminence that overlooks the town, and has a lofty marble tower. This government has nine large parishes; and is divided into four parts, Aigle, Bex, Olon, and Ormont. This last is among the mountains, and joins to Rougemont. It is a double valley, abounding in pasture-land. Iviron, in the diocese of Aigle, was in part buried by the fall of a mountain occasioned by an earthquake in 1584.

AIGLE, a small town, in France, in Upper Normandy, twenty-three miles from D'Evereux, and thirty-eight from Rouen. It is surrounded with walls and ditches, has six gates, three suburbs, and three parishes. It trades in corn, toys, and more particularly in needles and pins. E. Long. 1°. N. Lat. 49°. 45'.

AIGUILLON, a small town in France in the province of Guienne, situated at the confluence of the rivers Garonne and Lot.
AILUTSC, in heraldry, denotes a crofs with its four ends sharpened, but so as to terminate in obtuse angles.—It differs from the crofs fitchee, in as much as the latter tapers by degrees to a point, and the former only at the ends.

AILANA, AILATH, or AHELOTH, anciently a town of Arabia Petraea, situated near the Sinus Eilatites of the Red Sea. It was also called Elath, and Eloth, (Stephanus, Strabo, Moles.) The fame with Eilana.

AILE, in law, a writ which lies where a person's grandfather, or great-grandfather, being feized of lands, &c. in fee simple, the day that he died, and a stranger abates and enters the same day, and dispossesses the heir of his inheritance.

AILLESBURY, AYLESBURY, or ALESBURY, a borough town in Buckinghamshire, consisting of about 400 houses. It consists of several streets, though the houses are not very contiguous: the ftreel round about the market-place, in the middle of which is a convenl hall, where the fuch as are held, and form one of the ftreets for the county. It fends two members to Parliament: has a market on Saturdays: and three fairs for cattle, viz. on the Saturday before Palmfunday, June 14th, and September 25th. It is sixty miles south-east of Buckingham, and forty-four north-west of London. W. Long. 0.40. N. lat. 51.40.

AILMER, or ÆTHELMARE, Earl of Cornwall, and Devonshire, in the reign of king Edgar. It is not known of what family he was. His authority and wealth were great, and so also in appearance was his piety. He founded the abbey of Cerne, in Dorsetfure; and had so great a veneration for Edward, the brother of St Edmund the martyr, who had lived a hermit in that country, near the silver well, as they called it, that, with the affiilance of Archbishop Dunstan, he translated his relics to the old church of Cerne. In 1016, when Canute, the fon of Sweine, invaded England, and found himself foutly oppoled by that valiant Saxon prince Edmund Ironfide, the fon of Æthelred, the Earl Ailmer, with that arch traitor Eadric Streone, Earl of Mercia, and Earl Algar, joined the Dane againft their natural prince, which was one great caufe of the Saxons ruin. He did not long survive this: and we find mentioned in history only one fon of his, whose name was Æthelward, Earl of Cornwell, who followed his father's maxims, and was properly rewarded for it. For in 1018, Canute reaping the benefit of their treasons, and perceiving that the traitors were no longer ufeul, he caused the infamous Eadric Streone, and this Earl Æthelward, to be both put to death.

AILRED, or EALRED, abbot of Revelcy in Lincolnshire, in the reigns of Stephen and Henry II. He was born in 1169, of a noble family, and educated in Scotland with Henry the fon of king David. On his return to England, he became a monk of the Cifterian order, in the monastery of Revelcy, of which he afterwards was made Abbot. He died on the 12th of January 1166, aged 57, and was buried in his monaftery. “He was (fays Leland) in great esteem during his life; celebrated for the miracles wrought after his death; and admitted into the catalogue of saints.” He was author of several works; most of which were published by Gilbo the Jefuit at Douay, 1631; part of them may be also found in the Bibliotheca Cifterciensis and Bibliotheca Patrum. His principal work is the Speculum charitatis. Leland, Bale, and Pits, mention several manuscripts which were never published.

AILSA, an infufled rock on the western coast of Scotland, between the shores of Airthire and Cantyre. It is two miles in circumference at the base, is accessible only at one place, and rises to a great height in a pyramidal form. A few goats and rabbits pick up a subsistence among the short grasfs and furze; but the importance of the rock consists in the great variety and boundless numbers of birds, by which it is frequented, particularly the gannets and solan-geese, whose young are fed at the beft tables, and bring a good price. Other birds are caught for their feathers. The rock is rented from the Earl of Caflis at L. 33 per annum. The depth of the water around the base is from 7 to 48 fathoms. It is surrounded with excellent banks, well flocked with cod and other white fishes.

AIRNSWORTH (Th. A), a eminent nonconformist divine, who, about the year 1590, distinguished himself among the Browniffs; which drew upon him such troubles that he was obliged to retire to Holland, and became minister of a church at Amsterdam. His skill in the Hebrew language, and his exellent Annotations on the Holy Scriptures, which are still highly esteemed, gained him great reputation. He also wrote several pieces in defence of the Browniffs, and several other works.

AIRNSWORTH (Robert), born at Woodyale in Lancashire in 1660, was master of a boarding-school at Bithnal-green, from whence he removed to Hackney, and to other places in the neighbourhood of London. After acquiring a moderate fortune, he retired, and lived privately till the time of his death, which happened in 1743. We are indebted to him for the best Latin and English Dictionary extant, he published it in quarto 1736; and in 1752, the fourth edition, under the care of Doctor Ward of Grefham, College, and the Rev. William Younge, was enlarged to two vols folio.

AIR, in natural philosophy, a thin fluid, claflic, transparent, ponderous, comprefisible, and dilatable. It is such a fluid, that, when it is feparated from the earth, it may expand its bounds without any limits; and, being confined, do not abatement of any of its qualities. It is observable, that air thus qualified can affefl the vertigoes, and other nervous affections; and after taking cold, it is evident, the air can enter with all its powers into the colics, fluxes, coughs, and consumptions produced by damp, moth and nitrous air, it is evident it can corrupt and spoil the noble organs, &c.

Circulation of AIR in Rooms. To render the circulation of air fensible, let the air of a room be heated by a strong fire, whilst the air of a contiguous room is cold; then let the door between the two rooms be opened, in which cafe the hot air of one room being lighter, will pass through the upper part of the opening of the door into the cold room: and, on the contrary, the cold...
Air of the other room being heavier, will pass into the former room through the lower part of the opening; accordingly, it will be found, that applying a lighted candle at the top, in the middle, and at the lower part of the opening between the two rooms, a strong current of air will appear to pass from the hot into the cold room near the top; a contrary current of air will appear to pass from the latter into the former room near the lower part of the said opening; whilst in the middle there is little or no motion at all, as may be clearly perceived by the direction of the flame of the candle.

It is for the same reason that when the fire is lighted in a chimney, a strong current of air is occasioned to enter the room, which may be felt by applying the hand near the key-hole, or other such small openings, if the doors and windows are shut; for the air over the fire being heated, becomes lighter, and ascends into the chimney, consequently other colder air must supply its place, which forces its way through all the small openings it can find. Were a room with a fire in it to be perfectly closed, excepting the chimney, the air in it would soon become unwholesome for respiration, and the fire would be soon extinguished, besides other inconveniences. Hence it appears, that those persons mistake who expatiate to keep the air of a room sweet and wholesome, especially for convalescents, by accurately stopping all the smallest openings that admission of air. When the current of air that enters into a room is on some side of it where it falls immediately upon the persons who sit in the room, then it may be offensive, especially to delicate constitutions. In that case, such opening should be closed; but at the same time another opening should be made for admitting fresh air, in another more convenient part, for a circulation of air, especially in rooms where a fire is kept, is not only salutary and useful, but is absolutely necessary.

In an ingenious publication, intitled, A Practical Treatise on Chimneys, there are the following remarks relating to the proper method of admitting air into a room, and of expelling the contaminated air. The author, directing to make a vent-hole near the top of the room, in order to expel the heated and contaminated air, "this," says he "might be done by means of a small tube opening into the room, either in or near the ceiling; which might either be carried to the top of the building, or be made to communicate with the external air by a small perforation through the wall at the roof of the room; by means of either of which, a proper circulation would be established, and the foul air be carried off."

For the fire would no sooner have warmed any particles of air within the room, than these would be greatly expanded, and rise immediately upwards, so as to fill the higher parts of the room with rarefied air; and as other particles would be successively heated and rarefied in their turn, by their expansive force they would press upon the sides of the apartment in every place, so as to force the lightest particles through the opening left for that purpose in the top of the room; by which means the foulest air would be gradually drawn off, without deceasing again into the lower regions to the annoyance of the company. But in order to admit fresh air into the room, "Let," says he, "another opening be made in the ceiling of the room, having a communication with a small pipe that should lead from thence either to the outside of the wall, or to any other part of the building that might be judged more convenient, where it should be bent, and conducted downwards, till it reached the ground, where it should be left open, to communicate with the external air. In this situation the cool external air would be forced in at the lower opening of the tube, and made to ascend into the apartment in proportion to the quantity that escaped towards the higher regions by means of the ventilator. And as that weighty air would no sooner enter the room, that it would tend towards the floor by its own natural gravity; it would gradually mix with the heated air in its descent—become, in some measure, warmed by that means, and equally dispersed through the room, so as slowly and imperceptibly to reach the candles and the company in the room, and supply them with a sufficient quantity of fresh and wholesome air, without the inconveniences to which the company are subjected by the usual way of admitting fresh air (A). For if it enters near the floor of the apartment, it is hurried along in a rapid undivided stream towards the fire-place, and striking upon the legs and inferior parts of the body, afflicts them with a strong sensation of cold. To overcome the effects of this, large fires must be kept; by which other parts of the body are exposed to an extraordinary degree, which is productive of most of those disorders that are pernicious to the young, and often prove fatal to the old, during the winter season, in those cold regions.

Thus might our apartments be kept constantly, and moderately, and equally warm, at a moderate expense, without endangering our health on the one hand, by respiring a confined, stagnant, and purrid air, or, on the other hand, by subjecting ourselves to such danger of catching colds, consumptions, and rheumatic complaints, by being exposed to such exceedingly unequal

(A) Such readers as have been little acclimated to speculations of this sort, will be at a loss to comprehend in what manner two holes, both of them in the roof the room, and communicating with the air, without any valve, or other contrivance, for opening or closing of themselves, should yet answer the two very opposite purposes; one, of constantly bringing cool air into the room without emitting any warm air—and the other, of as constantly emitting warm and admitting no cool air. They will please to advert, that the one of these tubes communicates with the atmosphere at the bottom of the house, and the other towards the top; the opening of the one is beneath the level of the room, that of the other above it. Now, as the air is more dense at the surface of the ground than at any height above it, the warm rarefying air will naturally incline at that opening where it meets with least resistance, which must invariably be through that which opens to the external air at the greatest height; and as the cool air will naturally be pressed into the room by that opening where the air is most weighty, this must invariably be by that which is nearest the surface of the earth.
Air

The reader will easily perceive, that all that has been here said has a reference only to those apartments in cold climates, and rigorous weather, where fire to warm them becomes necessary. In warmer regions, or during the summer-seaon, there can be no objection to the wheel-ventilator in the window.—It is a simple contrivance, and a safe and effectual mean of preferring the air in our apartments sweet and wholesome at that season.

It is a vulgar error among many people, to believe that fire purifies the contaminated air, by destroying the noxious particles mixed with it; and for this reason they think, that the fire kept in a room where the air is tainted, purifies the room, by rendering the air in it again fit for respiration. Indeed, a fire kept in a room or apartment where the air is tainted, is as the cafe with hospitals, goals, and the like, does certainly purify the apartment, and the practice is very useful; but this effect is only because the fire promotes the circulation of the air, and dries the dampness of rooms, furniture, &c. so that it is not the infected air that is purified, but is new, fresh, and wholesome air, that by the action of the fire has taken the place of the infected air; which infected air, being rared by the heat, has been expelled from the apartment. Fire and combustion in general is so far from purifying contaminated air, that it actually contaminates a prodigious quantity of it in a short time; so that not only a common fire, but even a lighted candle, when kept in a well-clofed room, wherein the external air has not a free access, instead of purifying, renders the air of that room noxious.

Instrument for ascertaining the Purity or Wholesomeness of respirable air. See EUDIMETER.

Air Balloons, a general name given to bags of any light substance filled with inflammable air, or other permanently elastic fluid, whose specific gravity is considerably less than that of common atmospheric air. The consequence of their being filled in this manner, is, that if they are of any considerable magnitude, they ascend in the air; to an amazing height; and will not only ascend in this manner by themselves, but carry up along with them great weights, and continue to rise till they attain an height in which the circumambient air is of the same specific gravity with themselves. In this situation they will either float or be driven in the direction of the wind or current of air in which they are exposed, remaining in these elevated regions till the fluid escapes by the bursting of the bags from the superior elasticity of the fluid, or by its gradual evaporation through the pores of the envelope. The history, principles, &c. of these machines are detailed under the article Aerostation.

Air-Bladder, in siles. See Comparative Anatomy. chap. iii. and Ichthyology.

Air-Gun, a pneumatic machine for exploding bullets, &c. with great violence.

The common air-gun is made of brass, and has two barrels; the inside barrel A, fig. 8. which is of a small bore, from whence the bullets are exploded; and a large barrel E C L R on the outside of it. There is a sringe EMNP fixed in the block of the gun, by which the air is injected into the cavity between the two barrels through the valve E P. The ball K is put down into its place in the small barrel, with the hammer, as in any other air-gun. At S L is another valve; being opened by the trigger O, permits the air to come behind the bullet, so as to drive it out with great force. If this valve be opened and that suddenly, one charge of condensed air may be sufficient for several discharges of bullets; but if the whole air be discharged on one single bullet, it will drive it out with a great force. This discharge if effected by means of a lock, fig. 9, placed here as usual in other guns; for the trigger being pulled, the cock will go down and drive the lever O, fig. 8, which will open the valve, and let in the air upon the bullet K. Air-guns of late years have received very great improvements in their construction. Fig. 10, is a representation of one made by the late Mr. B. Martin of London, and now by several of the mathematical instrument and gun-makers of that metropolis. For simplicity and perfection it exceeds any other heretofore contrived. A is the gun-barrel, with the lock, floor, ram-rod, and of the size and weight of a common fowling-piece. Under the lock, at b, is a round feel tube, having a small moveable pin in the inside, which is pushed out when the trigger a is pulled, by the spring worked within the lock; to this tube, a hollow copper-ball e serves, perfectly air-tight. This copper-ball is fully charged with condensed air by the sringe B (fig. 7.) previous to its being applied to the tube b of fig. 10. It is then evident, that if a bullet be rammed down in the barrel, the copper ball, being fast at b, and the trigger a be pulled, that the pin in b will, by the action of the spring-work within the lock, forcibly strike out into the copper ball; and thereby pushing in suddenly a value within the copper ball, let out a portion of the condensed air; which air will rush up through the aperture of the lock, and forcibly act against the bullet, driving it to the distance of 60 or 70 yards or further. If the air is strongly condensed at every discharge, only a portion of the air escapes from the barrel; therefore, by decreasing the piece, another discharge may be made; and this is repeated to the amount of 15 or 16 times. An additional barrel is sometimes made, and applied for the discharge of shot, instead of the one above described.

The air in the copper ball is condensed by means of the sringe B (fig. 7.), in the following manner: The ball is ferewed quite close on the top of the sringe at b, at the end of the feel pointed rod a: is a stout ring through which passes the rod k: upon this rod the feet should be firmly set; then the hands are to be applied to the two handles i i, fixed on the side of the barrel of the sringe. Now, by moving the barrel B steadily up and down on the rod s the ball e will become charged with condensed air; and it may be easily known when the ball is as full as possible, by the irresistible action that the air makes against the pillow when you are working the sringe. At the end of the rod k is usually a four-square hole, which with the rod serves as a key to fasten the ball e fast on the screw b of the gun and sringe close to the orifice in the ball e. In the inside is fixed a valve and spring, which gives way for the admission of air; but upon its emission comes close up to the orifice, shutting up the internal air.
Air-guns. 

The piston-rod works air-tight, by a collar of leather on it, in the barrel B; it is therefore plain, when the barrel is drawn up, the air will rush in at the hole b. When the barrel is pushed down, the air therefrom will have no other way to pass from the preasure of the piston but into the balls at top. The barrel being drawn up, the operation is repeated, until the condensation is strong enough to resist the action of the piston.

Sometimes the syringe is applied to the end of the barrel C (see fig. 11), the lock and trigger shut up in a brass d; and the trigger pulled, or discharged made, by pulling the chain b. In this contrivance there is a round chamber for the condened air at the end of the syringe a, and it has a valve acting in a similar manner to that of the copper ball. When this instrument is not in use, the brass e is made to slide off, and the instrument then becomes a walking-flick; from which circumstance, and the barrel being made of cane, brass, &c. it has received the appellation of the Air-cane. The head of the cane unfastens and takes off at a, where the extremity of the piston rod in the barrel is shown: an iron rod is placed in a ring at the end of this, and the air condened in the barrel in a similar manner to that of the gun as above; but its force of action is not so strong as to resist the action of the piston.

The Magazine Air-gun was invented by that ingenious artist L. Colbe. By this contrivance ten bullets are lodged in a cavity, near the place of discharge, that they may be drawn into the shooting-barrel, and successively discharged as fast as to be nearly of the same use as so many different guns.

Fig. 12 represents the present form of this machine, where part of the stock is cut off, to the end of the injecting syringe. It has its valve opening into the cavity between the barrels, as before. K K is the small shooting-barrel, which receives the bullets from the magazine E D, which is of a serpentine form, and closed at the end D when the barrels are lodged in it. The circular part a b c, is the key of a cock, having a cylinde® hole through it, which is equal to the bore of the same barrel, and makes a part of it in the present situation. When the lock is taken off, the several parts Q, R, T, W, &c. come into view, by which means the discharge is made by pushing up the pin P, which raises and opens a valve V, to let the air against the bullet I, from the cavity F; which valve is immediately shut down again by means of a long spring of brass NN. This valve V being a conical piece of brass, ground very true in the part which receives it, will of itself be sufficient to confine the air.

To make a discharge, you will pull the trigger ZZ, which throws up the seer y a, and dingsages it from the stock a, upon which the strong spring WW moves the tumbler T, to which the cock is fixed. This, by its end v, bears down the end v of the tumbling lever R, which, by the other end m, raises at the same time the flat end of the horizontal lever Q; and by this means, of course, the pin P p, which stands upon it, is pushed up, and thus opens the valve V, and discharges the bullet. This is all evident from a bare view of the figure.

To bring another bullet to succeeed that marked I, instantaneously, turn the cylinde® cavity of the key of the cock, which before made part of the barrel K K, into the situation i, so that the part i may be at K; and hold the gun upon your shoulder, with the barrel downwards and the magazine upwards, by which means that bullet next the cock will fall into it out of the magazine, but go no farther into this cylinde® cavity than the two little sprigs s s, which detain it. The two circles represent the cock-barrel, where in the key abovementioned turns upon an axis not represented here, but visible in fig. 13. This axis is a square piece of steel, on which comes the square hole of the hammer H, fig. 14, by which the cylinde® cavity mentioned is opened to the magazine. Then opening the hammer, as in that figure, the bullet is brought into its proper place near the discharge-valve, and the cylinde® cavity of the key of the cock again makes part of the inward barrel K K.

It evidently appears how expedient a method this is of charging and discharging a gun; and were the force of condened air equal to that of gun-powder, such an air-gun would answer the end of several guns. In the air-gun, and all other cases where the air is required to be conden®ed to a very great degree, it will be requisite to have the syringe of a small bore, viz. not exceeding half an inch in diameter; because the pressure against every square inch is about 15 pounds; and therefore against every circular inch about 12 pounds. If therefore the syringe be one inch in diameter, when one atmosphere is injected, there will be a resistance of 12 pounds against the piston; and when 10 are injected, there will be a force of 120 pounds to overcome; whereas 10 atmospheres act against the circular half-inch piston (whose area is only one-fourth part so big) with only a force equal to 30 pounds; or 40 atmospheres may be injected with such a syringe, as well as 10 with the other. In short, the facility of working will be inversely as the squares of the diameter of the syringe.

Air-Jacket, a sort of jacket made of leather, in which are several bags, or bladders, composed of the same materials, communicating with each other. These are filled with air through a leather tube, having a brass stop-cock accurately ground at the extremity, by which means the air blown in through the tube is confined in the bladders. The jacket must be yet, before the air be blown into the bags, as otherwise it will immediately escape through the pores of the leather. By the help of these bladders, which are placed near the breast, the peron is supported in the water, without making the efforts used in swimming.

Air-Pipes, an invention for drawing foul air out of ships, or any other close places, by means of fire. These pipes were first found out by one Mr. Sutton, a brewer in London; and from him have got the name of Sutton's Air pipes. The principle on which their operation depends is known to every body, being indeed no other than that air is necessary for the support of fire; and, if it has not access from the places most adjacent, will not fail to come from those that are more remote. Thus, in a common furnace, the air enters through the air-hole; but if this is closed up, and a hole made in the side of the furnace, the air will rush in with great violence through that hole. If a tube of any length whatever is inserted in this hole, the air will rush through the tube into the fire, and of coil.
Air-pipes. consequence there will be a continual circulation of air in that place where the extremity of the tube is laid. Mr Sutton's contrivance then, as communicated to the Royal Society by Doctor Mead, amounts to no more than this. As, in every ship of any bulk, there is already provided a copper or boiling-place proportionable to the size of the vessel, it is proposed to clear the bad air, by means of the fire already used under the said coppers or boiling places for the necessary uses of the ship.

It is well known, that, under every such copper or boiler, there are placed two holes, separated by a grate, the first of which is for the fire, and the other for the ashes falling from the same; and that there is also a flue from the fire-place upward, by which the smoke of the fire is discharged at some convenient place of the ship.

It is also well known, that the fire once lighted in these fire-places, is only preferred by the constant draught of air through the forementioned two holes and flue; and that if the said two holes are closed up, the fire, though burning ever so briskly before, is immediately put out.

But if, after shutting the abovementioned holes, another hole be opened, communicating with any other room or airy place, and with the fire: its clear, the said fire must again be railed and burned as before, there being a like draught of air through the same as was before the flapping up of the first holes; this cafe differing only from the former in this, that the air feeding the fire will now be supplied from another place.

It is therefore proposed, that, in order to clear the holds of ships the bad air therein contained, the two holes abovementioned, the fire-place and flue-place, be both closed up with substantial and tight iron-doors; and that a copper or leaden pipe, of sufficient size, be laid from the hold into the flue-place, for the draught of air to come in that way to feed the fire. And thus it seems plain, from what has been already said, that there will be, from the hold, a constant discharge of the air therein contained; and consequently, that air, being discharged, must be constantly supplied by fresh air down the hatches or such other communications as are opened into the hold; whereby the fire must be continually freshened, and its air rendered more wholesome and fit for respiration.

And if into this principal pipe, so laid into the hold, other pipes are let in, communicating respectively either with the well or lower decks: it must follow, that part of the air, consumed in feeding the fire, must be respectively drawn out of all the places to which the communication shall be so made.

This account is so plain, that no doubt can remain concerning the efficacy of the contrivance; it is evident, that, by means of pipes of this kind, a continual circulation of fresh air would be occasioned thro' those places where it would otherwise be most apt to stagnate and putrefy. Several other contrivances have been used for the same purpose; and Doctor Hale's ventilators, by some unaccountable prejudice, have been reckoned superior in efficacy and even simplicity to Mr. Sutton's machine, which at its first invention met with great opposition*; and even when introduced by Dr Mead, who used all his interest for that purpose, was shamefuly neglected.

A machine capable of answering the same purpose was invented by Mr Defaguliers, which he called the ship's lungs. It consisted of a cylindrical box fixed up on one side, and fixed to a wooden pedestal. From the upper edge of the box issued a square trunk open at the end, and communicating with the cavity of the box. Within this box was placed a cylindrical wheel turning on an axis. It was divided into 12 parts, by means of partitions placed like the radii of a circle. These partitions did not extend quite to the centre, but left a space of about 18 inches diameter in the middle; towards the circumference, they extended as far as possible without interfering with the fire, so that the wheel might always be allowed to turn freely. Things being thus circumstanced, it is plain, that if the wheel was turned towards that side of the box on which the trunk was, every division would push the air before it, and drive it out through the trunk, at the same time that fresh air would come in through the open space at the centre, to supply that which was thrown out thro' the trunk. By turning the wheel swiftly, a strong blast of air would be continually forced out thro' the square trunk, on the fame principles on which a common fanner winnows corn. If the wheel is turned the opposite way, a draught of air may be produced from the trunk to the centre. If this machine, then, is placed in a room where a circulation of air is wanted, and the trunk made to pass through one of the walls; by turning the wheel swiftly round, the air will be forced with great velocity out of that room, at the same time that fresh air will enter through any chinks by which it can have access to supply that which has been forced out.

It is evident, that the circulation which is promoted by this machine, is entirely of the same kind with that produced by Mr Sutton's: the turning of the wheel in Mr Defaguliers's machine being equivalent to the rarefaction of the air by fire in Mr Sutton's: but that the latter is vastly superior, as acting of itself, and without intermission, requires no argument to prove. Mr Sutton's machine has yet another convenience, of which no other convenience for the same purpose can boast; namely, that it not only draws out putrid air, but destroys it by caufing it to pass through fire: and experience has abundantly shown, that though putrid air is thrown into a great quantity of fresh air, it is so far from losing its pernicious properties, that it often produces noxious diseases. We do not say, indeed, that putrid air becomes harmless by this means; but it is undoubtedly rendered less noxious than before; tho' whether it is equally innocent in the smoke of a fire fed in the common way, we cannot pretend to determine.

Besides this machine by Mr Defaguliers, the ventilators of Dr Hale, already mentioned, and those called wind-falls, are likewise used for the same purpose. The former of which is an improvement of the Helian-bellows*: the other is a contrivance for throwing fresh air into those places where putrid air is apt to lodge; but this has the last-mentioned inconvenience in a much greater degree than any of the others, as the blast of fresh air throws out that which was rendered putrid by stagnation, in such a manner as to contaminate all around it. See Wind-falls.
Air

Air-Thread, is also a contrivance by Doctor Hales to prevent the stagnation of putrid effluvia in jails, and other places where a great number of people are crowded together in a small space. It consists only of a long square trunk open at both ends; one of which is inserted into the ceiling of the room, the air of which is required to be kept pure; and the other extends a good way beyond the roof. Through this trunk a current of air is carried on, and the reason is, that the putrid effluvia which do so much mischief when collected, being much lighter than the pure atmosphere, arise to the top of the room; and, if there find a vent, will continually go out through it. These effluvia arise in very considerable quantity, being calculated by the late Dr Keill at no less than 39 ounces from one man in 24 hours.

These trunks were first made trial of by Mr Yeoman, over the House of Commons, where they were nine inches wide within, and over the Court of King's-bench in Westminster-hall, where they were six inches wide. They are sometimes made wider, and sometimes narrower; but the wider they are the longer they ought to be, more effectually to promote the ascent of the vapour. The reason why vapours of this kind ascend more swiftly through a long trunk than a short one, is, that the pressure of fluids is always according to their different depth, without regard to the diameter of their bases, or of the vessel which contains them; and, upon this principle, a gallon of water may be made to split a strong cork...PLANTS.

Air, in music, is taken in different senses. It is sometimes contradicted with harmony; and, in this sense it is synonymous with melody in general.—Its proper meaning is, a tune which is set to words, or to short pieces of poetry that are called songs.

In operas, we give the name of air to such pieces of music as are formed with measures and cadences, to distinguish it from the recitative; and, in general, every piece of music is called an air, which is formed for the voice, or even for instruments, and adapted to flanzas, whether it forms a whole in itself, or whether it can be detached from any whole of which it forms a part, and be executed alone.

If the subject admits of harmony, and is set in parts, the air is, according their number, denominated a duett, a trio, a quartette, &c. We need not follow Rouleau, and the other philologists, in their endeavours to investigate the etymology of the word air. Its derivation, though found and ascertained, would contribute little to illustrate its meaning in that remote sense, to which, through a long continuance of time, and the various vicissitudes of language, it has now palled. The curious may consult the same article in the Dictionnaire de Musique by M. Rouleau.

In modern music, there are several different kinds of air, each of which agrees to a certain kind of dancing, and from these dances the airs themselves take their specific names.

The air of our operas, are, if we may be permitted the
AIR [341]

the expression, the canvas or substratum upon which are painted all the pictures of imaginative music; melody is the design, and harmony the enchanting; every picturesque object selected from the most beautiful parts of nature, every reflected sentiment of the human heart, are the models which the artist imitates; whatever gains attention, whatever interests the soul, whatever charms the ear, or causes emotion in the heart, these are the objects of his imitation. See imitation.

An air which delights the ear, and discovers the learning of the composer; an air invented by genius, and composed with taste; is the noblest effort of music; it is this which explores the compass, and displays the delicacy, of a beautiful voice; it is in this where the charms of a well-conducted symphony shine; it is by this, that the passions, excited and inflamed by nice gradations, reach and agitate the soul through the avenues of external sense. After hearing a beautiful air, the mind is acquiescent and serene; the ear is satisfied, not disgusted: it remains impressed on the fancy, it becomes a part of our essence, we carry it with us, we are able to repeat it at pleasure: without the ability acquired by habit to breathe a single note of it, we execute it in our imagination in the same manner as we heard it upon the theatre: one sees the scene, the actor, the theatre; one hears the accompaniments and the applause. The real enthusiasm in music never forgets the beautiful airs which he has heard; when he chooses, he cautions the opera to recommence.

The words to which airs are adapted, are not always rearranged in regular succession, nor spoken in the same manner with those of the recitative; and, though, for ordinary, they are very short, yet they are interrupted, repeated, transposed, at the pleasure of the artist. They do not constitute a narrative, which once told is over: they either delineate a picture, which it is necessary to contemplate in different points of view; or inspire a sentiment in which the heart acquires with pleasure, and from which it is neither able nor willing to be disengaged; and the different phrases of the air, are nothing else but different manners of holding the same image. This is the reason why the subject of an air should be one. It is by these repetitions properly placed, it is by these redoubled efforts, that an impression, which at first was not able to move you, at length shakes your soul, agitates you, transports you out of yourself; and it is like upon the same principle, that the runnings, as they are called, or those long, mazy, and inarticulated inflections of the voice, which, in pathetic airs, frequently seem, though they are not always so, improperly placed; whilst the heart is affected with a sentiment exquisitely moving, it often expresses its emotions by inarticulate sounds, more strongly and feebly than it could by words themselves.

The form of airs is of two kinds. The small airs are often composed of two strains, which ought each of them to be sung twice; but the important airs in operas are frequently in the form of rondos.

AIR, or Ayr, in geography, a town of Scotland, capital of an extensive county of the same name. It stands on the river Air, and was formerly a place of good trade, and seat of fisheries; all of which have vanished, and the people now live by one another. Air appears from history and other documents, to have been a considerable place at the time of the Norman conquest. The vouchers of its antiquity are corroborated by an elegant building called the Greys, which has escaped the destructive rage of the last and preceding century. The date on this fragment of antiquity is 1055, consequently it hath stood in its place above 750 years; and it is to be wished, that the majority of the inhabitants may unite in preserving it from being destroyed by persons who have expressed a strong desire to that purpose. In 1557, the tax levied upon Air was £236 Scots; upon Glasgow only £202. In 1771, Air was attainted at 158 Stirl. and Glasgow at £18, £18. In 1771, the pickled herrings exported from Air were 6624 barrels; since the year 1777, none. These revolutions appear the more extraordinary, when we consider the very advantageous situation of Air both by land and by water; the fertility of the country; the riches of the sea; its contiguity to the western fisheries on one side, and to Glasgow on the other; the large returns for cattle, grain, and coal; the ample revenues of the town; and particularly the convenience of its harbour for fishing-vessels of every construction.—About a mile north from the town there is a lazaret-house, commonly called The King's Chapel, which King Robert de Bruce set apart for the maintenance of lepers.

AIRA, in botany: A genus of the triandria digyna class; and in the natural method ranking under the 4th order, Gramina. The characters are: The calyx is a two-flowered double-valved gume: The corolla is two-valved, and no rudiment of a flower between the florets: The stamina consist of three capillary filaments the length of the flower; the anthers are oblong, and forked at both ends: The pistillum is an egg-shaped germin: the styli are two, bluntly, and expanding; the stigmata are pubescent: There is no pericarpium; the including corolla grows to the seed: The seed is egg-shaped and covered. There are 14 species of the air, nine of which are natives of Britain. The English name is Hair-grass. See the general article Grass.

AIRANI, in church-history, an obscure sect of Arians, in the fourth century, who denied the consubstantiality of the Holy Ghost with the Father and the Son. They are otherwise called Arismani: some have said that they have taken their name from one Airas, who distinguished himself at the head of this party, in the reigns of Valentinian and Gratian.

AIRE, a town of France, in Proper Gascony, of which it is the capital, with a bishop's see. It is seated on the river Adour, on the declivity of a mountain. E. Long. o. 3. N. Lat. 43° 47'.

AIRE, a strong town in the Netherlands, in the county of Artois, with a castle. It was taken by the French in 1710, and was confirmed to them by the treaty of Utrecht. It is seated on the River Lis, 32 miles south of Dunkirk, and communicates with St. Omer's by a canal cut from the river Aa. E. Long. 2° 31'. N. Lat. 50° 38'.

AIRING, a term peculiarly used for the excising horsfes in the open air. It purifies the blood; purges the body from gross humours; and, as the jockies express it, teaches the horse how to make his wind take equally, and keep time with the other motions of his body. It also sharpens the stomack, and keeps the creature hungry; which is a thing of great consequence, as hunters and racers are very apt to have their stomack fall off, either from want of exercise, or from the too violent
exercise which they are often exposed to. If the horse be over fat, it is best to air him before fun-rise and after fun-setting; and in general, it is allowed by all, that nothing is more beneficial to those creatures than early and late airings. Some of our modern managers, however, dispute this: they say, that the cold of these times is too great for the creature; and that if, in particular, he is subject to catarrhs, rheums, or the like complaints, the dew and cold fogs, in these early and late airings, will be apt to increase all those disorders. Nature, we fee, also points out the fun-beams as of great use to these animals; those which are kept hardy and lie out all night, always running to those places where the sunshine comes, as soon as it appears in a morning. This should seem to recommend those airings that are to be made before fun-set, and a little time after fun-rise. As to the caution, so earnestly inculcated by Markham, of using these early and late airings for fat horses, it is found unnecessary by many: for they say, that the same effect may be produced by airings at warmer times, provided only that they are made longer; and that, in general, it is from long and found courage.

AIRS, in the manager, are the artificial motions of taming horses; as the demivolt, curvet, capriole, &c. AIRY, or AERY, among sportmen, a term expressing the neft of a hawk or eagle.

AJUGA, Bugle: A genus of the gymnospermia order, belonging to the didynamia class of plants; and in the natural method ranking under the 42d order, Afterfifiope. The characters are: The calyx is a short perianthium, monophyllous and persistent: The corolla is monopetalous and grinning: The flower consists of four erect filaments; the anthers are dimidiated: The pistillum has a four-cleft germin, a filiform style, and two slender stigmas. There is no perispermium; the calyx converging, and containing the seeds in its bome: The seeds are four, and oblong. The species enumerated by Linnaeus are, 1. The orientalis, with inverted flowers, which is a native of the east. 2. The generiftis, with woolly leaves and hairy cups, is a native of Swiftherland and of the southern parts of Europe. 3. The pyramidalis, or mountain-bugle, with a square pyramidal spike and blue flowers, is a native of Sweden, Germany, Switzerland, and the hilly parts of Britain. Sheep and goats eat it; cows are not fond of it; horses and fwine refuse it. 4. The reptans, common or pature bugle, with creeping suckers, and blue, red, or white blossoms, in long leafy spikes, is a native of the southern parts of Europe, and is met with in woods and moift places in many parts of Britain. The roots are a infringent, and firkle a black colour with vitriol of iron.

Culture. The first species is propagated by sowing the seeds soon after they are ripe, in a pot filled with loamy earth, and placed in a shady situation till autumn; when it muft be removed under a frame, and protected from the frosts. In the spring, after the plants are come up, let them be translated each into a separate pot, and in summer placed under a shady situation. The other sorts are easily propagated by their fide-floats, anducced bed in a moift shady situation.

AIUS LOCUTIUS, the name of a deity to whom the Romans erected an altar. The words are Latin, and signify a speaking voice. The following accident gave occasion to the Romans erecting an altar to the Aius Locutius. One M. Sedilius, a pheasant, acquainted the tribunes, that, in walking the streets by night, he had heard a voice over the temple of Vesta, giving the Romans notice that the Gauls were coming against them. This intimation was however neglected; but after the truth was confirmed by the event, Camillus acknowledged this voice to be a new deity, and erected an altar to it under the name of the Aius Locutius.

AJUTAGE, or ADJUTAGE, a kind of tube fitted to the mouth of the vessel through which the water of a fountain is to be played. To the different form and structure of ajutages, is owing to the great variety of fountains. See Fountain and Hydrostatics.

AIX, a small but ancient town in the duchy of Savoy, with the title of a marquifate. It is fét on the lake Bourget, at the foot of a mountain, between Chambrery, Annecy, and Rumilly. There is here a triumphal arch of the ancient Romans, but it is almost entirely ruined. The mineral waters bring a great number of strangers to this place. The place was originally called Aquae Gratianae, from the hot baths built there by the Emperor Gratian. L'Long. 7. 10. N. Lat. 45. 40.

AIX, an ancient city, the capital of Provence, in France. It is an archbishopric; and has a parliament, a court of aids, a chamber of accounts, a feneschal’s jurisdiction, a generality, and an university. It has that air of silence and gloom so common in character of places instituted of commerce or industry: It is, however, a well-built city; and most like Paris of any place in the kingdom, as well for the largeness of the buildings, as in respect of the politeness of the inhabitants. It is embellished with abundance of fine fountains, and several beautiful squares. The preachers square is on the side of a hill; it is about 160 yards in length, and is surrounded with trees, and houses built with stone three stories high. The town-hall is at one end of the city, and is distributed into several fine appartments: the two lowest are taken up by the board of accounts, and by the seneschal; that above is designed for the sittings of parliament. The hall of audience is adorned with the pictures of the kings of France on horseback. The hotel of the city is a handfome building, but laid by the houses of the narrow street in which it is placed. The cathedral church is a Gothic structure, with tombs of several earls of Provence, and some good pictures by French masters. The Corfe, or Orbi­telle, is a magnificent walk, above 300 yards long, formed by a triple avenue of elms, and two rows of regular and flatly houfe. The church of the fathers of the oratory is a handsome building; and not far from thence is the chapel of the blue pentents, which is full of paintings. The convent of preachers is very fine; in their church is a silver statue of the Virgin Mary almost as big as the life. There are other churches and buildings
buildings which contain a great number of rarities. The baths without the city, which were discovered not long since, have good buildings, raised at a vast expense, for the accommodation of those who drink the waters. Although Aix was the first Roman settlement in Gaul, it is not remarkable for ancient remains. The warm springs from which it is now known and frequented, induced Sextus Calvinus to found a colony here, to which he gave the name of Aqua Sextia. They were supposed to possess particular virtues in cases of debility; and several altars have been dug up sacred to Priapus, the inscriptions on which indicate their gratitude to that deity for his supposed skill and assistance. E. Long. 5. 32. N. Lat. 43. 32.

Aix, a small island on the coast of France, between the isle of Olceron and the continent. It is twelve miles north-west of Rochfort, and twelve south-west of Rochelle. W. Long 4. N. Lat. 46. 5.

Aix la Chapelle, a fine city of Germany, in the circle of Westphalia and duchy of Juliers. All authors are agreed about its antiquity, it being mentioned in Caesar's Commentaries and the Annals of Tacitus. The Romans had colonies and fortresses here, when they were at war with the Germans; but the mineral waters and the hot bath so increased its fame, that, in process of time, it was advanced to the privileges of a city, by the name of Aquae Graniæ, that is, the waters of Granius; that which it has now, of Aix la Chapelle, was given it by the French, to distinguish it from the other Aix. It is so called, on account of a chapel built in honour of the Holy Virgin by Charlemagne; who having repaired, beautified, and enlarged the city, which was destroyed by the Huns in the reign of Attila, in 451, made it the usual room of 162 feet in length and 60 in breadth. In this the new-elected emperor formerly entertained all the electors of the empire.

In regard to bathing, this also must be determined by the age, sex, strength, &c. of the patient, and by the season. The degree of heat of the bath should likewise be considered. The tepid ones are in general the best, though there are some cafes in which the hotter ones are most proper. But even in these, it is best to begin

Aix la chappelle is a free imperial city, and changes its magistracy every year on the eve of St John Baptist. The mayor is in the nomination of the elector palatine, in the quality of the duke of Juliers, as protector of the city. This place is famous for several councils and treaties of peace concluded here; particularly those between France and Spain in 1668, and between Great Britain and France in 1748.

The hot sulphureous waters for which this place has so long been celebrated, arise from several fountains, which supply eight baths constructed in different parts of the town. These waters near the sources are clear and pellucid; and have a strong sulphureous smell resembling the washings of a foul gun; but they lose this smell by exposure to air. Their taste is saline, bitter, and urinous. They do not contain iron. They are also neutral near the fountain, but afterwards are manifestly and pretty strongly alkaline, insomuch that clothes are washed with them without soap.—On the vaults above the springs and aqueducts of these waters is found, every year, when they are opened, a quantity of fine white-coloured flowers of sulphur, which has been sublimed from the waters.

The heat of the water of the hottest spring, by Dr Lucas's account, raises the quicksilver of Fahrenheit's thermometer to 136—by Montf. Monet's account, to 146—and the heat of the fountain, where they commonly drink, by Dr Lucas's account to 112.

Dr Simmons has given the following account of their several temperatures, as repeatedly observed by himself with a thermometer constructed by Nairne.

The spring which supplies the Emperor's bath (Bain de l'Empereur), the New Bath (Bain Neuf), and the Queen of Hungary's bath (Bain de la Reine de Hongrie), is heated to 127°.

St Quirin's bath (Bain de St Quirin), is heated to 112°.

The Rofe bath (Bain de la Rose), and the Poor's bath (Bain des pauvres), both which are supplied by the same spring, is heated to 112°.

Charles's bath (Bain de Charles), and St Cornelle's bath (Bain de St Cornelle), is heated to 112°.

The spring used for drinking is in the High street, opposite to Charles's bath; the heat of it at the pump is 106°.

Dr Lucas evaporated the water of the hottest spring (the Emperor's Bath), and obtained 268 grains of solid matter from a gallon, composed of 15 grains of calcareous earth, 10 grains of felenites, and 243 grains of a saline matter made up of sodium and sea salt. They are at first nauseous and harsh, but by habit become familiar and agreeable. At first drinking, also, they generally affect the head. Their general operation is by food and urine, without griping or diminution of strength; and they also promote perspiration. The quantity to be drank as an alternative is to be varied according to the constitution and other circumstances of the patient. In general, it is best to begin with a quarter or half a pint in the morning, and increase the dose afterwards to pints, as may be found convenient. The water is best drank at the fountain. When it is required to purge, it should be drank in large and often repeated draughts.
These waters are efficacious in diseases proceeding from indigestion and from weakness of the stomach and bowels. In rheumatisms; in the fever, seroplasma, and diseased states of the skin; in hysterical and hypochondriacal disorders; in nervous complaints and melancholy; in the stone and gravel; in paralytic complaints; in those evils which follow an injudicious use of mercury; and in many other caes. They ought not, however, to be given in hasty cafes where there is heat and fever, in putrid disorders, or where the blood is dissolued, or the constitution much broken down.

The time of drinking, in the first season, is from the beginning of May till the middle of June; and, in the latter season, from the middle of August to the latter end of September.

There are galleries or piazzas under which the company walk during the time of drinking, in order to promote the operation of the waters.—The poor's bath is free for every body, and is frequented by crowds of poor people.

It is scarcely necessary to add, that there are all kinds of amusements common to other places of public resort; but the harpers appear more splendid here than elsewhere, affuming titles, with an equipage suitable to them.—Aix la Chapelle is 21 miles from Spa, 36 from Liege, and 30 from Cologne. E. Long. 5. 48. N. Lat. 51. 55.

AIZOON, called by Mr. Miller's temperance; though the name Aizoon has been by some writers applied to opinion from, but not remarkable either for beauty or any other part of the college of Physicians, and one of the physicians at St. Thomas's Hospital; and, upon the establishment of the queen's household, appointed one of the physicians to her majesty.
and a fine poet. His conversation was of the most delightful kind; learned, instructive, and without any affection of wit, cheerful and entertaining.

Dr Akenfide died of a putrid fever, June 23, 1770; and is buried in the parish-church of St James's, Westminster.

His poems, published soon after his death in 1740 and 1750, consist of "The pleasures of imagination," two books of "Odes," a "Hymn to the Niads," and some "Inscriptions." The pleasures of imagination," his capital work, was first published in 1744; and a very extraordinary production it was from a man who had not reached his 22d year. He was afterwards sensible, however, that it wanted revision and correction; and he went on revising and correcting it for several years: but finding this unsatisfactory, he abandoned the purpose of correcting, and resolved to write the poem over anew upon a somewhat different and enlarged plan. He finished two books of his new poem, a few copies of which were printed for the use of the author and certain friends; of the first book in 1757, of the second in 1765. He finished also a good part of a third book, and an introduction to a fourth; but his most munificent and excellent friend, conceiving all that is executed of the new work, too inconsiderable to supple the place, and supersede the republication of the original poem, and yet too valuable to be withheld from the public, hath caufed them both to be inserted in the collection of his poems.

AKIBA, a famous rabbin, flourished a little after the destruction of Jerusalem by Titus. He kept the flocks of a rich citizen of Jerusalem till the age of his family, and then applied himself to study in the academies for 24 years; and was afterwards one of the greatest masters in Israel, he having 24,000 scholars. He declared for the impostor Barcochebas, whom he owned for the Messiah; and not only anointed him king, but took upon himself the office of his master of the horfe. The troops which the emperor Hadrian sent against the Jews, who under the conduct of this false Messiah had committed horrid massacres, exterminated this fanatic. Akiba was taken and put to death with great cruelty. He lived 120 years; and was buried with his wife in a cave upon a mountain not far from Tiberias, and his 24,000 scholars were buried round about him upon the same mountain. It is imagined he invented a fupposititious work under the name of the patriarch Abraham.

AKISSA T, the ancient Thyatira, a city in Natazia, in Asia, situated in a plain 18 miles broad, which produces plenty of cotton grain. The inhabitants, who are reckoned to be about 50,000, are said to be all Mahometans. The houses are built of nothing but earth or turf dried in the sun, and are very low and ill contrived: but there are six or seven mosques, which are all of marble. There are remarkable inscriptions on marble in several parts of the town, which are part of the ruins of ancient Thyatira. It is seated on the river Hermus, 50 miles from Pergamos. E. Long. 28° 30'. N. Lat. 38° 40'.

AKOND, an officer of justice in Persia, who takes cognizance of the causes of orphans and widows; of contracts, and other civil concerns. He is the head of the school of law, and gives lectures to all the subaltern officers; he has his deputies in all the courts of the kingdom, who, with the second judica, make all contracts.

Al, an Arabic particle prefixed to words, and signifying much the same with the English particle the: Thus they say, alkermes, alkoran, &c. i.e. the kermes, the koran, &c.

Al, or A L, a Saxon term, frequently prefixed to the names of places, denoting their antiquity; as Alborough, Alidgate, &c.

AL, a Latin term properly signifying a wing; from a resemblance to which several other things are called by the same name: Thus, Ala, is a term used by botanists for the hollow of a flalk, which either the leaf, or the pedicle of the leaf, makes with it, or it is that hollow turning, or sinus, placed between the stalk or branch of a plant and the leaf, whence a new offspring usually issues. Sometimes this is used for those parts or leaves otherwise called lobes or wings.

Ala (the plural number) is used to signify those petals or leaves of papilionaceous flowers, placed between those others which are called the vexillum and carina, and which make the top and bottom of the flowers. Instances of flowers of this structure are seen in those of pea and beans, in which the top leaf or petal is the vexillum, the bottom the carina, and the side ones the alae.

Ala is also used for those extremely slender and membranaceous parts of some seeds, which appear as wings placed on them; it likewise signifies those membranaceous expansions running along the stems of some plants, which are therefore called alated stalks.

A L, in anatomy, a term applied to the lobes of the liver, the cartilages of the nostril, &c.

A L, in the Roman art of war, were the two wings or extreme parts of the army drawn up in the order of battle.

ALABA, one of the three smallest districts of Biscay in Spain, but pretty fertile in rye, barley, and fruits. There are in it very good mines of iron, and it had formerly the title of a kingdom.

ALABANDA (anc. geog.), a town in Caria, near the Meander, situate beneath eminences resembling falks with pack-faddles, which gave rise to the jalak: and between Amyzo to the west and Stratonice to the east. Under the Romans they enjoyed ails, or a convention of jurisdiction, by Pliny reckoned the fourth in order: hence the proverb in Stephani, expressing their happiness. It was built by Alabandus, whom therefore they deemed a god. The people were called Alabaudi, Alabandus, &c; Cicero; and Alabandus, after the Greek manner, in coins of Augustus and Claudius; they were also called Alabendus (Livy).

ALABARCHA, in antiquity, a kind of magistrate among the Jews of Alexandria, whom the emperors allowed them to elect, for the superintendence of their policy, and to decide differences and disputes which arose among them.

ALABASTER (William) an English divine, was born at Hadley in the county of Suffolk. He was one of the doctors of Trinity college in Cambridge; and he attended the earl of Essex as his chaplain in the expedition to Cadiz in the reign of queen Elizabeth. It
and some considerable effect. However that matters, he joined himself to the Romish communion, but was disappointed in his expectations. He was soon displeased at this; he could not reconcile himself to the discipline of that church, which made no consideration of the degrees which he had taken before. It is probable too that he could not approve of the worship of creatures, which protestants are used to look upon with horror. Upon this move he turned immediately to the mystick, afforting, that Adam signified misery and misery, and of the rest. His verses were greatly esteemed. He wrote a Latin tragedy, intitled Roxana; which, when he was translated into a college at Cambridge, was attended with a very remarkable accident. There was a lady who was terrified at the last word of the tragedy, Seguar, Seguar, which was pronounced with a very shocking tone, that she left herfenes all her lifetime after. Alabaster was living in 1630. His Apparatus in Revolutionem Jesu Chrifti was printed at Antwerp, in 1607. Adamus, fugit Spiraculis Ubaram ex fuis Spiritualem Expeditionem ex auxiliis Pentagrammatum significationibus, and his Ecce Sponsus venit, fui tuba pulchritudinis, hoc est demonstratis quod non fit illicitum nec impossible computare durationem mundi & tempus secundum adventus Chrifti, they were printed at London. We may judge from these tittes what the taste and genius of the author was.

Alabaster, in natural history, a species of that genus of stones whose base is calcareous earth. It differs from the marble in being combined, not with the aerial, but with vitriolic acid; therefore, when mixed with any acid, no effequence appears. It is fusible in about 500 times its weight of water at the temperature of 60. It is fusible alone in a long-continued porcelain heat, or by the blow-pipe. Specific gravity 1.87. Texture granular, with thinning particles. In composition, and consequently in its chemical properties, it does not differ from gypsum, selinite, and plaster of Paris.

There are three species of alabaster. 1. The snowwhite thinning alabaster, or lydium of the ancients, is found in Taurus, in pieces large enough to make dikes, or the like. It cuts very freely, and is capable of a fine polish. 2. The yellowish alabaster, or phen-
ALABASTER MENDROIDE, a kind of laminated alabaster, beautifully variegated with the figures of shrubs, trees, &c. found in great abundance in the province of Hohenheim.

ALADINISTS, a sect among the Mahometans, answering to fire-chasers among us.

ALADILIA, a considerable province of Turkey, in Asia, in that part called Nacolia, between the mountains of Antitaurus, which separate it from Amasia, on the north, and from Carnimania on the west. It has the Mediterranean sea on the south; and the Euphrates, on the east, which divides it from Diarbeker. It comprehends the lesser Armenia of the ancients, and the east part of Cilicia.

ALAMA, it is now divided into two parts: the north, comprehended between Taurus, Antitaurus, and the Euphrates, is a beglerbeglic, which bears the name of Marash, the capital town; and the south, between mount Taurus and the Mediterranean, is united to the beglerbeglic of Aleppo. The country is rough, ragged, and mountainous; yet there are good pastures, and plenty of herbs and camels. The people are hardy and chieftain. The capital is Malatigah.

ALAIN (Chartier), secretary to Charles VII. king of France, born at Florence, of an ancient family, in the year 1386. He was the author of several works in prose and verse; but his most famous performance was his Chronicle of king Charles VII. Bernard de Girard, in his preface to the History of France, styles him "an excellent historian, who has given an account of all the affairs, particulars, ceremonies, speeches, answers, and circumstances, as he was present himself, or had information of." Giles Coroet tells us, that Margaret daughter to the king of Scotland, and wife to the dauphin, passing once through a hall where Alain lay asleep, the shop and killed him before all the company who attended some of them telling her, that it was strange the should kiss a man who had few charms in his person, she replied, "I did not kiss the man, but the mouth from whence proceed so many excellent sayings, so many wise discourses, and so many elegant expressions." Mr. Fontenelle, among his Dialogues of the Dead, has one upon this incident, between the princess Margaret and Plato. Mr. Patiquier compares Alain to Seneca, on account of the great number of beautiful sentences interpersed throughout his writings.

ALALIS, a considerable town of France, in the province of Languedoc, situated on the river Gardon, at the foot of the Cevennes. The Jesuits had a college in this place; and a fort was built here in 1689. It is 24 miles north of Montpellier, and 340 from Paris.

ALAMANNI (Lewis), in French Alamans, archbishop of Arles, and cardinal of St Cecilia, was one of the greatest men of the fifteenth century. The cardinal presided in the council of Basil, which deposed Eugenius IV. and elected the antipope Felix V. He was much contemned by Alain Sylvius, as a man extremely formed for presiding in such assemblies, firm and vigorous, illustrious by his virtue, learned, and of an admirable memory in recapitulating all that the orators and disputants had said. One day, when he had argued against the superiority of the pope over the council, he distinguished himself in such an eminent manner, that several persons went to kiss him, while others pressed even to kiss his robe. They extolled to the skies his abilities and genius, which had raised him, though a Frenchman, to a superiority over the Italians, notwithstanding all their natural facility and finesse. There is no need of asking, whether pope Eugenius thundered against the president of a council which deposed him. He deprived him of all his dignities, and treated him as a font of iniquity. However, notwithstanding this, Lewis Alamandus died in the odour of sanctity, and performed so many miracles after his death, that at the request of the canons and Celestine monks of Avignon, and the solicitation of the cardinal of Clermont, legate a latere of Clement VII. he was beatified by that pope in the year 1527.

ALAMANNI (Lewis) was born at Florence, of a noble family, on the 28th of October 1497. He was obliged to fly his country for a conspiracy against Julius de Mezié, who was soon after chosen pope under the name of Clement VII. During this voluntary banishment, he went into France; where Francis I. from a love to his genius and merit, became his patron. This prince employed him in several important affairs, and honoured him with the collar of the order of St. Michael. About the year 1549, he was admitted a member of the Inquisition, an academy newly erected at Padua, chiefly by Daniel Barbaro and Ugo Martelli. After the death of Francis, Henry duke of Orleans, who succeeded him in 1547, shewed no less favour to Alamann; and in the year 1551, sent him as his ambassador to Genoa: this was his last journey to Italy; and being returned to France, he died at Amboise on the 18th of April 1556, being in the 61st year of his age. He left many beautiful poems, and other valuable performances, in the Italian language. We have also some notes of his upon Homer's Iliad and Odyssey; those upon the Iliad were printed in the Cambridge edition of Homer in 1689; and Joshua Barnes has also infected them in his fine edition of Homer in 1711.

ALAMODALITY, in a general sense, is the accommodating a person's behaviour, dress, and actions, to the prevailing taste of the country or times in which he lives.

ALAMODALITY of writing, is defined the accommodation of mental productions, both as to the choice of subject and the manner of treating it, to the genius or taste of the times, in order to render them more acceptable to the readers.

ALAMODE, a phrase originally French, importing a thing to be in the fashion or mode. The phrase has been adopted not only into several of the living languages, as the English and High-Dutch, but some have even taken it into the Latin. Hence we meet with Alamodicus and Alamodatias.
ALAMO (Balshafar), a Spanish writer, born at Medina del Campo in Castile. After having studied the law at Salamanca, he entered into the service of Anthony Perez, secretary of state under Philip II. He was in high esteem and confidence with his master, upon which account he was imprisoned after the disgrace of this minister. He was kept in confinement 11 years when Philip III. coming to the throne, set him at liberty, according to the orders given by his father in his will. Alamos continued in a private capacity, till the duke of Olivarez, the favourite of Philip IV. called him to public employments. He was a man of wit as well as judgment, but his pen was superior to his tongue. He died in the 88th year of his age. His Spanish translation of Tacitus, and the aphorisms which he added in the margin, gained him great reputation. This work was published at Madrid in 1614; and was to have been followed, as mentioned in the king's privy council, He was kept in confinement 11 years yet appeared. The author composed the whole during his imprisonment.

ALAN (Cardinal William), was born at Roslil in Lancashire, in the year 1532. He went to Oxford at the age of 15, and in 1550 was elected fellow of Oriel college. In 1556, being then only 24 years old, he was chosen principal of St. Mary's hall, and one of the professors of the university. In 1558 he was made canon of York; but, upon queen Elizabeth's accession to the throne, he left England, and settled at Louvain in an English college, of which he became the chief support. In 1565 he visited his native country; but, on account of his extreme activity in the propagation of the Roman Catholic religion, he was obliged to fly the kingdom in 1568. He went first to Mechlin, and then to Doway, where he was made doctor of divinity. Soon after, he was appointed canon of Cambay, and then canon of Rheims. He was created cardinal on the 28th of July 1587, by the title of St. Martin in Montibus; and obtained from the king of Spain a rich abbey in the kingdom of Naples, and afterwards the bishopric of Mechlin. It is supposed to have been by the advice and instigation of this priest, that Philip II. attempted to invade England. He died on the 20th of October 1594, aged 63; and was buried in the English college at Rome. He was a man of considerable learning, and an elegant writer. He wrote many books in defence of the Roman religion. The most remarkable are: 1. A defence of the 12 martyrs in one year. Tho. Alfield was hanged for bringing, and publishing, this and other of Alan's works, into England, in the year 1584. 2. A declaration of the sentence of Sextus, &c. A work intended to explain the pope's bull for the excommunication of queen Elizabeth, and to exhort the people of England to take up arms in favour of the Spaniards. Many thousands of copies of this book, printed at Antwerp, were put on board the armada; but the enterprise failing, they were afterwards destroyed. 3. Of the worship due to saints and their relics, 1585. This treatise was answered by lord Burleigh, and is esteemed the most elegant of the cardinal's writings.

ALAND, an island of the Baltic seas, between Sweden and Finland, subjected to the former. It lies between 17 and 19 degrees of E. long. and between 59 and 61 degrees of Lat. at the entrance of the gulf of Bothnia.

ALARAF, in the Mahometan theology, the partition wall that separates heaven from hell. The word is plural, and properly written al araf; in the singular it is written al arf. It is derived from the Arabic verb arafa, to distinguish. Al araf gives the denomination to the seventh chapter of the alcoran, wherein mention is made of this wall. Mahomet seems to have copied his al araf, either from the great gulf of separation mentioned in the New Testament, or from the Jewish writers, who also speak of a thin wall dividing heaven from hell. Mahometan writers differ extremely as to the persons who are to be found on al araf. Some take it for a sort of limbo for the patriarchs, prophets, &c. others place here such whole good and evil works as exactly balance each other, that they deserve neither reward nor punishment. Others imagine this intermediate space to be possessed by those who, going to war without their parents leave, and suffering martyrdom there, are excluded for their disobedience, yet escape hell because they are martyrs.

ALARBES, a name given to those Arabians who live in tents, and distinguishes themselves by their drees from the others who live in towns.

ALARES, in Roman antiquity, an epithet given to the cavalry, on account of their being placed in the two wings of the army.

ALARIC, a famous general of the Goths. He entered Thrace at the head of 200,000 men, and laid waste all the country through which he passed. He marched next to Macedonia and Thessaly: the Thes- falians met him near the mouth of the river Peneas, and killed about 5000 of his army; nevertheless he advanced into Greece, and having ravaged the whole country, returned to Epirus, loaded with immense spoils: after having here five years, he resolved to turn his arms to the west. He marched through Panonia; and, finding little resistance, entered Italy, under the consulship of Silicho and Aurelianus, A.D. 400. After various battles and treaties, he at last took Rome by treachery, and permitted his soldiers to plunder it; this happened A.D. 409. Alaric, having laid waste a great part of Italy, intended to pass into Sicily; but a storm obliging him to land again, he besieged the city of Cosenza; and having taken it, he died there in 411, eleven years after he first entered Italy.

ALARM, in the military art, denotes either the apprehension of being suddenly attacked; or the notice thereof, signified by firing a cannon, firelock, or the like. False alarms are frequently made use of to harass the enemy, by keeping them constantly under arms. Sometimes also this method is taken to try the vigilance of the piquet-guard, and what might be expected from them in case of real danger.

ALARF, Bell, that rung upon any sudden emergency, as a fire, mutiny, or the like.

ALARF-PoF, or ALARF-place, the ground for drawing up each regiment in case of an alarm. This is otherwise called the rendezvous.

ALARF, wading, is the same with what is otherwise called an appeal, or challenge.
From his watch-tow'r in the skies,
Till the dappled dawn doth rise.

It continues its harmony several months, beginning early in the spring, on pairing. In the winter they assemble in vast flocks, grow very fat, and are taken in great numbers for the tables. They build their nest on the ground, beneath some clod, forming it of hay, dry fibres, &c. and lay four or five eggs. — These birds are taken in great quantities in the neighbourhood of Dunstable in England: the season begins about the 14th of September, and ends the 25th of February; and during that space, about 4000 dozen are caught, which supply the markets of the metropolis of that kingdom. See Bird-Catching. Vastly greater numbers than the above, however, are at times caught in different parts of Germany, where there is an excite upon them. Kekulé says, that the excite alone produces 6000 dollars every year to the city of Leipsic; whose larks are famous all over Germany as having the most delicate flavour. But it is not at Leipsic only that they are taken in such numbers, but also in the country about Naumburg, Merleburg, Halle, and other parts. — 2. The pretensis, or little-lark, has the two outward feathers of the wing edged with white, and frequents the meadows. It is found frequently in low marshy grounds: like other larks, it builds its nest among the graves, and lays five or six eggs. Like the wood-lark, it sits on trees; and has a most remarkable fine note, singing in all situations, on trees, on the ground, while it is perching in the air, and particularly in its deficient. This bird, with many others, such as the thrush, black-bird, willow-wren, &c. become silent about midsummer, and resume their notes in September: hence the interval is the most mute of the year's three vocal seasons, spring, summer, and autumn. Perhaps the birds are induced to sing again as the autumnal temperament resembles the vernal. — 3. The arborea, or wood-lark, is a native of Europe, and is distinguished by an annular white fillet about the head. It is inferior in size to the sky-lark, and is of a shorter thicker form; the colours are paler, and its note is less sonorous and less varied, though not less sweet. It perches on trees, and whistles like the black-bird. It will sing in the night; and, like the common lark, will sing as it flies. It builds on the ground, and makes its nest on the outside with moss, or within of dried grass, lined with a few hairs. It lays five eggs, dull, and blotched with deep brown marks, darkest at the thicker end. The males of this and the last are known from the females by their superior size. But this species is not near so numerous as that of the common kind. — 4. The campetris, has one half of its chief feathers of the wings brown, except two in the middle which are white, and the throat and breast are yellowish. — 5. The trivialis, whose chief feathers on the tail are brown, only half of the outermost is white, and the second is white at the end, in the shape of a wedge; there is likewise a double whitish line on the wings. It is a native of Sweden, and perches on the top of trees. — 6. The erithaca: the chief tail-feathers are black, but the two outermost are edged with white, and the head is crested. It is a native of Europe. It sings well, like the sky-lark; lays four or five eggs; and is said to hatch twice in a year. — 7. The mipsolleta: the chief tail-feathers are black, only
only the outermost two are obliquely half white. It is a native of Italy.—8. The alpestris: the chief wing-feathers are half white, the throat yellow, and it has a black streak under the eyes and on the breast. It inhabits North America, where it is migratory. It visits the neighbourhood of Albany the beginning of May, but goes farther north to breed. In winter it comes in flocks into Virginia and Carolina, returning North in spring. It feeds, during its stay in the more southern parts, on oats and other grain; and while at Albany, on the grass and the buds of Spurge-birch. It runs into holes; whence the natives of these last parts have given it the name of *chi-chop-pis-feto.* The English call it the ortolan, and reckon it delicious eating. By some it is called snow-bird, as being very plentiful in that season. It is frequently caught in great numbers by means of horse-hair springs placed in some bare place, the snow being scraped away, and a little chaff strewn about. It is always seen on the ground, and has little or no long. This bird is not peculiar to North America: we here of it in Germany also; and is in plenty throughout Russia and Siberia, going northward in spring. The magna, is yellow on the belly, with a crooked black streak on the breast, and the three side-feathers of the tail white. It is a native of Africa and America.—10. The New Zealand lark (Plate XVIII.) is seven and a half inches in length: the bill is half an inch, of a pale ash-colour, with the upper part black: the upper parts of the body are dusky, edged with pale ash-colour: the breast and belly are white: the legs reddish ash-colour, and the claws black. It inhabits Charlotte Sound, and is called *koko aruere.*

**ALAUTA** is a considerable river of Turkey in Europe, which, after watering the north-east part of Transylvania and part of Wallachia, falls into the Danube almost opposite to Nicopolis.

**ALAY,** signifying in the Turkish language "The Triumph," a ceremony which accompanies the assembling together the forces of that vast empire upon the breaking out of a war. It consists of the most invidious buffoonery, and is attended with acts of the most shocking barbarity. That which took place upon occasion of the late war between the Porte and Russia is described by Baron Tott in his Memoirs as follows.

"It consists in a kind of Masquerade, in which each trade successively presents to the spectators the mechanical exercizes of its respective art. The labourers draw his plough, the weaver handles his shuttle, the joiner his plain; and these different characters, seated in cars richly ornamented, commence the procession, and precede the standard of Mahomet, when it is brought out of the seraglio to be carried to the army, in order to inflame victory to the Ottoman troops.

"This banner of the Turks, which they name *Sundjat-Cherif,* or the Standard of the Prophet, is so revered among them, that, notwithstanding its reputation has been so often tarnished, it still retains their implicit confidence, and is the sacred signal unto which they rally. Every thing proclaims its sanctity. None but the emirs are allowed to touch it; they are its guards, and it is carried by their chief. The Muffulmen alone are permitted to look upon it. If touched by other hands, it would be defiled; if seen by other eyes, profaned. In short, it is encompassed by the most barbarous fanaticism.

"A long peace had unfortunately caused the ridiculous, and especially the danger of this ceremony to be forgotten. The Christians imprudently crowded to see it; and the Turks, who, by the situation of their houses, could make money of their windows, began to profit by the advantage; when an emir, who preceded the banner, proclaimed with a loud voice, 'Let no infidel dare to profane with his presence the holy standard of the prophet; and let every Mussulman who perceives an unbeliever make it known under pain of reprobation.'

"From that moment no asylum was to be found; even those became informers, who, by letting out their houses, had rendered themselves accomplices in the crime. A religious fury seized on every mind, and put arms in every hand; the more atrocious the cruelty, the more was it meritorious. No regard was paid to sex or age; pregnant women, dragged by the hair, and trodden under feet by the multitude, perished in the most deplorable manner. Nothing was respected by these monsters; and under such auspices the Turks commenced the war."

**ALB** or **ALBE,** in the Roman church, a vestment of white linen hanging down to the feet, and answering to the surplice of the English clergy. In the ancient church, it was usual, with those newly baptized, to wear an alb, or white vestment; and hence the *Sunday* after Easter was called *dominica in albis,* on account of the albs worn by those baptized on Easter-day.

**Ala** is also a name of a Turkish coin, otherwise called *Aser.*

**ALBA** (anc. geogr.), a town of the Marsi in Italy, situated on the north-side of the Lacus Fucinus, still retaining in its name. It stands upon an eminence, and is noted in Roman history for being the state prison where captive princes were shut up, after being barbarously dragged through the streets of Rome at the chariot wheels of a triumphant consul. Peres king of Macedon terminated his wretched career in this confinement, with his son, the last hope of an illustrious line of kings. Syphax the Numidian, and Biraunus king of the Averni, were also condemned to this gaol by the particular clemency of the senate, which sometimes indulged its savage disposition by putting its captives to death.

Alba being situated in the centre of Italy, amidst difficult mountainous passes, and far from all means of escape, was esteemed a most proper place for the purpose of guarding prisoners of importance. Artificial strength was added to its natural security by fortifications, which remain to this day in a state that proves their ancient solidity. For the entertainment of the garrison, which was required in a place of such consequence, an amphitheatre was erected, of which the ruins are still visible, as well as the foundations of a temple, and other buildings of Roman times.

Lucius Vitellius, brother to the emperor of that name, had a villa near this place, famous for the variety and excellence of its fruit-trees, which he had brought from Syria. His gardens were the nurseries where several of the most delicious stone-fruits, that are now so common in Europe, were first cultivated and multiplied. It
It must have been necessary at Alba to shelter trees transplanted from Alia, and to treat them with great tenderness and care, in order to rear them to perfection: for the climate of this high region is extremely rigorous in winter; the cold leaon falls long, and is accompanied with violent storms of wind and falls of snow. The lake has been often frozen entirely over.

Alba Firma, or Album, in old cufioms, denoted rent paid in silver, and not in corn, which was called black-mail.

Alba Terra, one of the numerous names for the philosopher's stone.

Alba Regalis. See STILL WEISSENBURGH.

Alba Helvetiorum, or Albavilus, (anc. geog.), afterwards called Vivarium, now Viviers, in the southeast of Languedoc, on the Rhone. In the lower age the inhabitants were called Albenes, and their city Civitas Albensium, in the Notitia Galliae. E. Long. 4° 45. Lat. 44° 50.

Alba Julia (anc. geog.) now Weissenburg, a town of Transylvania, on the river Marius, or Merich, to the west of Hermatrat, supposed to be called Alba Julia, after Julia Domna the mother of Caracalla. There are, however, several inscriptions found at or near Weissenburg, which bear Col. Apuln., without the least mention of Alba Julia, though inscribed after Caracalla's time. Add, that Ulpian, reciting the colonies of Dacia, calls this a river, over which was near Ulmaburg, a white town and living God, who created all things.

Alba Julia, there is a mention of the town and living God, who created all things.

Alba Longa (anc. geog.), a colony from Lavinium, in Latium, established by Acanthus the son of Anaes at the foot of the Mons Albanus, called Alba, from a white fow found by Anaes, which farrowed 30 white pigs at that spot; which circumstance was interpreted to portend the building of a city there in 30 years after (Proportius). The epithet Longa was added on account of its length. It was the royal residence till the building of Rome, as was foretold by Anchises (Virgil); it was destroyed by Tullius Hostilicus, all but the temple; and the inhabitants were transplanted to Rome (Strabo).

Alba Pompeia (anc. geog.), on the river Cela, now Ceno, in Liguria, the birth-place of the emperor Pertinax; a colony either established at first by Pompey, or re-established by him after having been before settled by Scipio. The inhabitants were called Alpenius Pompeiani. At this day the town is simply called Alba, without any epithet.

ALBAHURIM, figura septuagesima laterum, a figure of great importance according to astrological philosophers, who build their prognostics on it.

ALBAN (St) is said to have been the first person who suffered martyrdom for Christianity in Britain; he is therefore usually styled the protomartyr of that island. He was born at Verulam, and flourished towards the end of the third century. In his youth he took a journey to Rome, in company with Amphibalus a monk of Caereton, and served seven years as a soldier under the emperor Diocletian. At his return home, he settled in Verulam; and, through the example and instructions of Amphibalus, renounced the errors of paganisimus, in which he had been educated, and became convert to the Christian religion. It is generally agreed, that Alban suffered martyrdom during the great persecution under the reign of Diocletian; but authors differ as to the year when it happened; Bede and others fix it in 286; some refer it to the year 296; but Ulfius reckons it amongst the events of 323. The story and circumstances relating to his martyrdom, according to Bede, are as follows. Being yet a pagan (or at least it not being known that he was a Christian), he entertained Amphibalus in his house. The Roman governor being informed thereof, sent a party of soldiers to apprehend Amphibalus; but Alban, putting on the habit of his guest, presented himself in his stead, and was carried before that magistrate. The governor having asked him of what family he was, Alban replied, "To what purpose do you inquire of my family; if you would know my religion, I am a Christian." Then being asked his name, he answered, "My name is Alban; and I worship the only true and living God, who created all things." The magistrate replied, "If you would enjoy the happiness of eternal life, delay not to sacrifice to the great gods." Alban answered, "The sacrifices you offer are made to devils; neither can they help the needy, or grant the petitions of their votaries." His behaviour so enraged the governor, that he ordered him immediately to be beheaded. In his way to execution, he was stopped by a river, over which was a bridge so thronged with spectators that it was impossible to cross it; the faint, as we are told, lifted up his eyes to heaven, and the stream was miraculously divided, and afforded a passage for himself and a thousand more persons. Bede does not indeed give us the name of this river; but, notwithstanding this omission, the miracle, we suppose, will not be the less believed. This wonderful event converted the executioner upon the spot, who threw away his drawn sword, and, falling at St Alban's feet, defined he might have the honour to die with him. This sudden conversion of the headman occasioning a delay in the execution till another person could be got to perform the office, St Alban walked up to a neighbouring hill, where he prayed for water to quench his thirst, and a fountain of water sprang up under his feet; here he was beheaded, on the 23d of June. The executioner is said to have been a signal example of divine vengeance; for as soon as he gave the fatal stroke, his eyes dropped out of his head. We may see the opinion of Mr Milton in regard to this narrative, in his History of England. His words are these, speaking of St Alban, "The story of whose martyrdom, foiled and worse martyred with the faling zeal of some idle fancies, more fond of miracles than apprehensive of the truth, deserves no longer digression." Between 400 and 500 years after St Alban's death, Offa, king of the Mercians, built a very large and stately monastery in his memory, and the town of St Albans in Hertfordshire takes its name from that monastery.

ALBANA (anc. geog.), a sea-port town of Albia, on the Calpine sea, between the rivers Carius and Albanus; now called Bachi or Bachy, giving name to the Calpine sea, viz. Mare de Bachi. E. Long. 49°. Lat. 49°.

ALBANENSES, in church-history, the fame with Albigenenses, according to some: according to others, different. These, however, who are for distinguishing them.
Albani, a province of Turkey in Europe, on the Gulph of Venice, bounded by Livadia on the south, by Thessaly and Macedonia on the east, and on the north by Bofnia and Dalmatia. The people are strong, large, courageous, and good soldiers; but are said to be of a thievish disposition: the grand seigniors procure excellent soldiers from hence, particularly cavalry, known by the name of Armaus. There are several large towns in this province; and the inhabitants are almost all Christians of the Greek church, and descended from the ancient Scythians. Formerly it was part of the kingdom of Macedonia. Their chief manufactures are carpets. The principal places are Durazzo, Velona, Antivari, Scutari, Croya, Aleifo, Dibra, Doligno, and Albanopolis. Long. from 28° to 32° E. Lat. from 39° to 43° N.

Albania, a country of Asia, bounded on the west by Iberia; on the east by the Caspian Sea; on the north by Mount Caucasus; on the south by Armenia, and the river Cyrus, now Kura; which, springing from the Mochian mountains that separate Colchis from Armenia, and watering the country of Mogen, receives the Araxes and Araxes, and falls into the Caspian Sea within a small distance from the southern borders of this country. — The whole country formerly called Albania, now goes under the names of Shirwan and Elg-Georgi, and is extremely fruitful and pleasant. The ancient historians take notice of the Albanian men being tall, strong-bodied, and, generally speaking, of a very graceful appearance; far excelling all other nations in comeliness as well as stature. Modern travelers take no notice of the appearance of the men, but extol the beauty of the women, which seems to be unnoticed by the ancients. The Albanians were anciently an independent and powerful people; but we find no mention made of their kings till the reign of Alexander the Great, to whom the king of Albania is said to have presented a dove of an extraordinary size. — It does not appear that the Alba-
ALBANO, a town of Italy, on a lake of the same name, in the Campagnia of Rome. It was called by the ancients Albam Lompanis, and built out of the ruins of the ancient Alba Longa, which was destroyed by Tullus Hostilius. It stands within twelve miles south-east of Rome, and for the pleasantries of its situation is the summer retirement of a great many Roman princes. It is likewise the see of a bishop, who is one of the six senatorial cardinals. The town is famous for its excellent wine, and the ruins of a mausoleum, which, according to the tradition of the inhabitants, was made for Aesculapius. The prospect from the garden of the Capuchins is extremely pleasant, taking in the Campagna of Rome, and terminating in a full view of the Tufcan sea. Close by the town lies the Alban lake, an oval figure, and about seven miles in circumference, which, by reason of the high mountains round it, looks like the area of a great amphitheatre. It abounds with excellent fish, and over against the hermitage it is said to be unfishable. The mountain of Albano is called Montea Cavos, on the top of which was a celebrated temple dedicated to Jupiter and Juno. Near the Capuchins there is another convent of Franciscans; and not far from thence the palace of Cardinal Barberini, remarkable for very pleasant gardens, with the ruins of ancient baths, and several old fragments of Mosaic work. E. Long. 13° 10'. N. Lat. 41° 43'.

There is likewise another town of the same name in the Basilicate of the kingdom of Naples, remarkable for the fertility of the surrounding territory, and for the nobility of the inhabitants.

ALBANS (St.), a market town of Hertfordshire, is a very great thoroughfare, accommodated with good inns, on the north-west road from London, at the distance of 21 miles. This town sends two members to parliament, gives the title of duke to the noble family of Beauclerke, and has one of the best markets for wheat in England. St. Albans is seated near the ruins of an ancient Roman city, by Tacitus called Verolam; and by the Saxons Watlingestefter, because it is seated on the road called Watling's street. Nothing now remains of Verolam but the ruins of old walls; in the fields adjacent to which they continue to find Roman coins, as they formerly found tessellated pavements. In memory of St. Alban, Offa, king of the Mercians, anno 795, erected an abbey, calling it St. Albans; and near it the town of the same name was afterwards built. The church of the abbey is remaining to this day: time and the weather have made it look like stone on the out side; but if you break a bit off, the redness of the brick immediately appears. When the monasteries were dissolved, the townsmen paid L. 400 to prevent its being levelled with the ground, and have since converted it into a parish church, which, for its largeness, beauty, and antiquity, claims a particular regard. It had a very noble font of solid brass, in which the children of the kings of Scotland were used to be baptized; and was brought from Edinburgh, by Sir Philip Lee, when that city was in flames: but in the times of the late civil wars, it was taken away. Not many years since, a tomb was discovered in this church, said to be that of Humphrey Duke of Gloucester: when the leaden coffin was opened, the body was pretty entire, being preserved in a sort of pickle. There was a flatey cross in the middle of the town, as there were in many other places where queen Eleanor's body rested when it was brought out of the north for interment at Westminster; but it has been demolished, as some say, by the inhabitants. The market-days are Wednesdays and Saturdays. W. L. o. 12. N. L. 51. 44.

ALBANUS MONS (anc. geog.), now called Mount Alban, 16 miles from Rome, near where Alba Longa stood.

ALBANUS MONS (anc. geog.), to the north of Hatria, called Alba by Strabo; the extremity of the Alps, which, together with the mountains to the east, joining it, called Mons Belis, separates the farther Liburnia and Dalmatia from Pannonia.

ALBANY, a city of North America, in the state of New-York, situated upon the west side of Hudson's river, 160 miles north of the city of New-York. It contains about 4000 inhabitants, collected from almost all parts of the northern world. The houses are built in the old Dutch Gothic style, with the gable end to the street, and are seldom more than one story and a half high; they are by no means elegant, but are kept very clean. Albany, from its being seated on a fine river, at the head of flool navigation, surrounded with a rich and extensive back country, and the store-house of the trade to and from Canada, is in a flourishing condition. It has of late, however, had a formidable rival in the new city of Hudson. W. Long. 44° 29'. N. Lat. 42° 36'.

ALBARAZIN, a strong town, and one of the most ancient of the kingdom of Arragon in Spain. It is seated upon an eminence, near the river Guadalquivir, a little below its source, and on the frontiers of Valencia and New Castile. It is the seat of a bishop; and produces the best wool in all Arragon. It is about 100 miles east of Madrid. E. Long. 2° 10'. N. Lat. 40° 22'.

ALBARI, in antiquity, properly denoted those who gave the whitening to earthen vessels, &c. in which sense they flood contradistinguished from Dealbatori, who whitened walls.

ALBARIUM OPUS, in the ancient building, the incrustation or covering of the roofs of houses with white plaster, made of mere lime. This is otherwise called opus album. It differs from Tectarium, which is a common name given to all roofing or ceiling, including even that formed of lime and sand, or lime and marble; whereas Albarium was restrained to that made of lime alone.

ALBATROSS, in ornithology, a species of the diomedes. See Dromedia.

ALBAZIN, a town of Greater Tartary, with a strong castle. It is situated upon the river Amur, or Yamour, and belongs to the Musscovites. E. Long. 103° 30'. N. Lat. 54° 0'.

ALBE, a small piece of money, current in Germany, worth only a French sol and seven deniers.

ALBEMARLE, or AUMARLE, a town of France, in Upper Normandy, and in the territory of Caux, from whence the noble family of Keppel takes the title of Earl. The ferges of this town are in high esteem.
A L B

I. defpair of learning what his habit required: but that such a thing was
impossible to avoid. However, it is featured in a beautiful plain, which is well cultivated; and the suburbs of Placentia, born in 1664; who, by his prophecies. He had great knowledge in the original, to the employment of
Levant by the way of Marseilles. made a machine in the shape of a man, into for a century
the court of Spain, and to the dignity of cardinal. He founds; like to the machines of
('me bit of his order, embraced Lutheranism, and condu-

II. See

III. is

secret of Poland, and to descend to his male heirs. mention for not preferring divinity, he should

Albertus Magnus, a Dominican friar, and afterwards bishop of Ratibon, was one of the most
learned men and most famous doctors of the 13th century. He is said to have acted as a man-midwife; and some have been highly offended that one of his pro-
fession should follow such an employment. A book intitled De Natura Rerum, of which he was reputed
the author, gave rise to this report. In this treatise there are several infractions for midwives, and so much skill shown in their art, that one would think the author
could not have arrived at it without having himself practiced; but the advocates for Albert say he was not the writer thereof, nor of that other piece De
Secretis Mutilorum; in which there are many phrases and expressions unavoidable on such a subject, which
gave great offence, and raised a clamour against the supposed author. It must be acknowledged, however, that there are, in his Comment upon the Master of Sentences, some questions concerning the practice of con-
jugal duty, in which he has used some words rather too gross for chaste and delicate ears: but they allege what he himself used to say in his own vindication, that he came to the knowledge of so many monstrous things at confession, that it was impossible to avoid touching upon such questions. Albert was certainly a man of a most curious and inquisitive turn of mind, which gave rise to other accusations brought against him. They say, that he laboured to find out the philosopher's stone, that he was a magician; and that he made a machine in the shape of a man, which was an oracle to him, and explained all the difficulties he
proposed. He had great knowledge in the mathematics, and by his skill in that science might probably have formed a head with springs capable of articulating sounds; like to the machines of Boetius, of which Caiusdiros has said, "Metals lowe; the birds of Diomedes trumpet in brays; the brazen serpent hisses; counterfeited swallows chatter, and such have no proper note, from brays send forth harmonious music." John Matthaeus de Luna, in his treatise De Rerum Historiis, has attributed the invention of fire-arms to
Albert; but in this he is confused by Naude, in his Apologie des Grandis Hommes. We are told, that Albert was naturally very dull, and so incapable of instruction as to be upon the point of quitting the cloister, from despair of learning what his habit required: but that the Holy Virgin appeared to him, and asked him in which he chose to excel, philosophy or divinity? that having chosen the former, she assured him he would become incomparable therein; but that, as a punish-
ment for not preferring divinity, he should think, before he died, into his former stupidity. It is added, that after this apparition he had an infinite deal of wit; and that he advanced in all the sciences with so quick a progress, as utterly astonished his masters; but that three years before his death, he flopped short when reading a divinity-lecture at Colign; and having in vain endeavoured to recall his ideas, he found that the Virgin's prediction was accomplished. "It would be very unnecessary (says Sully, after relating these particulars) to observe that they are fables. Those who would believe me need not be told this, since they would judge in the same manner of their own accord; and as for such as think otherwise, they would not alter their opinion by reading here, that I am of a dif-
f erent way of thinking." Albert died at Colign, November 15, 1280. His works were printed at Lyons, in 1651, in 21 volumes in folio.

Albertus, a gold coin, worth about 14 French livres: it was coined during the administration of Albertus archduke of Austria.

Albesia, in antiquity, a kind of shields otherwise called Decumena. See Decumana.

Albi, a city of France, the capital of the Albigeois, in Languedoc, and the see of an archbishop. The cathedral is dedicated to St. Clelia, and has one of the finest choirs in the kingdom. Here is a very valuable silver shrine, of exquiste workmanship, of the Mosaic kind: it contains the relics of St. Clair, the first bishop of this city. The chapel of this pretended saint
The Albigeois is a small town about twenty seven miles in length, and twenty in breadth, abounding in corn, wood, grapes, farron, plums, and sheep: and the inhabitants drive a great trade in dried prunes, grapes, a coarse sort of cloth, and wines of Guillac. These wines are the only fine hereabouts that are fit for exportation: they are carried down to Bourdeaux, and generally sold to the British. They have likewise several coal-mines.

ALBIGENSES, in church-history, a sect or party of reformers, about Toulouse and the Albigeois in Languedoc, who sprang up in the 12th century, and distinguished themselves by their opposition to the discipline and ceremonies of the Roman church.

This sect had their name, it is supposed, either by reason there were great numbers of them in the diocese of Albi, or because they were condemned by a council held in that city. In effect, it does not appear that they were known by this name before the holding of that council. The Albigeois were also called Albiani, Albigenes, Albi, and Albives, though some distinguish these last from them. Other names given to them are, Henriquenses, Abelardites, Bulgarians, &c. Some on account of the qualities they assumed; others on that of the country from whence it is pretended they were derived; and others on account of persons of note who adopted their cause, as Peter de Brins, Arnold de Breffe, Abelard, Henri, &c. Berengarius, on the other hand, himself, is by some ranked in the number. The Albigeois are frequently confounded with the Waldenses, from whom, however, they differ in many respects, both as being prior to them in point of time, as being found as to articles of faith, and only separating from the society of confessions and penances; maintained marriage unlawful; laughed at purgatory, prayers for the dead, images, crucifixes, &c. — There were likewise said to be two classes of them: the Perfect, and the Believers. The perfect boasted of their living in continence, of eating neither flesh, eggs, nor cheese. The believers lived like other men, and were even loose in their morals; but they were persuaded they should be faved by the faith of the perfect, and that none were damned who received imposition of hands from them. But from these charges also they are generally acquited by Protestants: who consider them as the pious inventions of the Roman church, whose members deem it meritorious by any means to blacken heretics.

However this be, the Albigeois grew so formidable, that the Catholics agreed upon a holy league or croifade against them. They were at first supported by Raimond, count of Toulouse. Pope Innocent III. de- ferous to put a stop to their progress, sent a legate into their country; which failing, he stirred up Philip Augustus, king of France, and the other princes and great men of the kingdom, to make war upon them. Upon this the count of Toulouse, who had sided with them, made his submission to the pope, and went over to the Catholics: but soon after, finding himself plundered by the croifaders, he declared war against them, and was joined by the king of Arragon. His army was defeated at the siege of Muret, where he himself was killed, and the defeat followed by the surrender of the city of Toulouse, and the conquest of the greatest part of Languedoc and Provence. His son Raimond succeeded him: who agreed with the king and the pope to set up the inquisition in his estates, and to extirpate the Albigenses. In an assembly held at Milan, the archbishop of Toulouse drew up articles, agreeable to which the court made a most ample declaration against them, which he published at Toulouse in 1253. From this time the Albigenses dwindled by little and little; till the times of the Reformation, when such of them as were left fell in with the Vaudois, and became conformable to the doctrine of Zuinglius and the disciples of Geneva.

ALBIGENSES is also a name sometimes given to the followers of Peter Vaud, or Waldo; and hence synonymous with what we more properly call Waldenses, or Poor Men of Lyons. In this sense the word is applied by Camerarius, Thuanus, and several other writers. The reason seems to be, that the two parties agreed in their opposition to the papal innovations and incroachments, though in divers other respects they appear to be different enough. The bishop of Meaux labours hard to support a distinction between the two sects, alleging that the Albigenses were heretics, and Manichaeans; whereas the Waldenses were only schismatics, not heretics; being found as to articles of faith, and only separating from the church of Rome on account of forms and discipline. Dr Allix endeavours to set aside the distinction, and shows, that both of them held the same opinions, and were equally condemned and held for heretics: and this not for points of faith, but for declaiming against the papal tyranny and idolatry, and holding the pope to be the Antichrist; which last, according to M. de Meaux, constitutes nothing less than the peculiar mark of Manichaeism.
Manicheism. In this sense the Lollards and Wickliffites in England were not only Albigenens but Manichees.

ALBINTEMELIUM, ALBINTEMELIUM, (Tactus;) or at full length, ALBIUM TEMELIUM, (Pliny, Strabo;) now Vivintimiglia, situated in the south-west of the territory of Genoa, near the borders of the county of Nice, with a port on the Mediterranean, at the mouth of the rivulet Rotta, almost about half-way between Monaco and S. Remo. E. Long. 7. 40. Lat. 43° 17'.

ALBIOCE, or ALBICE, (Pliny, Strabo;) otherwise called Rea Apliniarum, from their superstitious worship of Apollo; also Civitas Requinre; now Rie, in Provence, about 18 leagues to the north-east of Toulon, on the north side of the rivulet Verdon; was originally a Roman colony, (Inscription.) It was sometimes written Regium. The people were called Albici, (Caesar.) E. Long. 1. 0. Lat. 43° 20'.

ALBINI, in antiquity, the workmen employed in what was called Opus Albarium. They make a different profession from the dealers in whiteners. ALBINOS, the name by which the Portuguese call the white Moors, who are looked upon by the negroes as monsters. They at a distance might be taken for Europeans; but, when you come near them, their white colour appears like that of persons affected with a leprosy.

In Sauvage's Voyages dans les Alpes, is the following account of two boys, at Chamouni, who have been called Albinos. "The elder, who was at the end of the year 1785 about twenty, or one-and-twenty years of age, had a dull look, with lips somewhat thick, but nothing else in his features to distinguish him from other people. The other, who is two years younger, is rather a more agreeable figure; he is gay and sprightly, and seems not to want wit. But their eyes are not blue; the iris is of a very distinct rose-colour; the pupil too, when viewed in the light, seems decidedly red; which seems to demonstrate, that the interior membranes are deprived of the aures, and of that black mucous matter that should line them. Their hair, their eye-brows, and eye-lashes, the down upon their skin, were all, in their infancy, of the most perfect milk-white colour, and very fine; but their hair is now of a reddish cast, and has grown pretty strong. Their sight too is somewhat strengthened; though they exagerrate to strangers their aersion for the light, and half-shut the eye-lids, to give themselves a more extraordinary appearance. But those who, like me, have seen them in their infancy, before they were tormented to this deceit, and when too few people came to Chamouni to make this affection profitable to them, can attest that then they were not very much offended with the light of day. At that time, they were so little de- fiers of exciting the curiosity of strangers, that they hid themselves to avoid such; and it was necessary to do a fort of violence to them before they could be prevailed on to allow themselves to be inspected. It is also well known at Chamouni, that when they were of a proper age they were unable to tend the cattle like the other children at the same age; and that one of their uncles maintained them out of charity, at the time of life when others were capable of gaining a subsistence by their labour.

I am therefore of opinion, that we may consider these two lads as true Albinos: for if they have not the thick lips and flat noses of the white negroes, it is because they are albino of Europe, not of Africa. This infirmity affects the eyes, the complexion, and the colour of the hair; it even diminishes the strength, but does not alter the configuration of the features. Besides, there are certainly in this melady various degrees: some may have less strength, and be less able to endure the light; but these circumstances in those of Chamouni are marked with characters sufficiently strong to intitle them to the unhappy advantage of being classed with that variety of the human species denominated Albino.

When nature presents the same appearance often, and with circumstances varied, we may at last discover some general law, or some relation which that appearance has with known causes: but when a fact is so singular and so rare, as that of those Albino, it gives but little scope to conjectures; and it is very difficult to verify those by which we attempt to explain it.

I at first imagined that this disease might be referred to a particular port of organic debility; that a relaxation of the lymphatic vessels within the eye might offer the globules of the blood to enter too abundantly into the retina, the aures, and even into the retina which might occasion the redness of the iris, and of the papil. The same debility seemed also to account for the intolerance of the light, and for the whitening of the hair.

But a learned physiologist, M. Blumenbach; professor in the university at Göttingen, who has made many profound observations on the organs of sight, and has conferred with great attention the albino of Chamouni, attributes their infirmity to a different cause. "The study of comparative anatomy has furnished him with frequent opportunities of observing this phenomenon; he has found it in brutes, in white dogs, and in owls; he says, it is generally to be seen in the warmed blooded animals; but that he has never met with it in those with cold blood.

From his observations, he is of opinion, that the redness of the iris, and of the other internal parts of the eye, as well as the extreme sensibility that accompanies this redness, is owing to the total privation of that brown or blackish mucus, that, about the fifth week after conception, covers all the interior parts of the eye in its found flate. He observes, that Simon Pontius, in his treatise de Coloribus Oculorum, long ago remarked, that in blue eyes the interior membranes were less abundantly provided with this black mucus, and were therefore more sensible to the action of light. This sensibility of blue eyes agrees very well, says M. Blumenbach, with northern people, during their long twilight; while, on the contrary, the deep black in the eyes of negroes enables them to support the splendor of the sun's beam in the torrid zone.

As to the connection between this red colour of the eyes and whiteness of the skin and hair, the same learned-physiologist says, that it is owing to a similarity of structure, confused in similitudine fabrice. He affirms, that this black mucus is formed only in the delicate cellular substance, which has numerous blood-vessels contiguous to it, but contains no fat; like the inside of the eye, the skin of negroes, the frontal palate of several domestic animals, &c. And, lastly, he says,
At the very time that L. Blumenbach was reading this memoir to the Royal Society of Gottingen, M. Buzzi, surgeon to the hospital at Milan, an able and celebrated anatomist, published, in the C. Pegio, Societ. de Medicina, 1784, tom. viii, p. 114, a very interesting memoir, in which he demonstrates by dissection what Blumenbach had only suppoosed.

"A peasant of about 30 years of age died at the hospital of Milan of a pulmonary disorder. His body being exposed to view, was exceedingly remarkable by the uncommon whiteness of the skin, of the hair, of the beard, and of all the other covered parts of the body. M. Buzzi, who had long defined an opportunity of dissection, sought a subject immediately seized upon him. He found the iris of the eyes perfectly white, and the pupil of a rose-colour. The eyes were disected with the greatest possible care, and were found entirely destitute of that black membrane which anatomists call the uvea; it was not to be seen either behind the iris, or under the retina: within the eye there was only found the choroid coat extremely thin and tinged, of a pale red colour, by vessels filled with discoloured blood. What was more extraordinary, the skin, when detached from different parts of the body, seemed also entirely destitute of the rete mucosum, which did not discover the least vestige of this, nor even in the wrinkles of the abdomen, where it is most abundant and most visible.

M. Buzzi likewise accounts for the whiteness of the skin and of the hair, from the absence of the rete mucosum, which, according to him, gives the colour to the cuticle, and to the hairs that are scattered over it. Among other proofs of this opinion, he alleges a well-known fact, that if the skin of the blackest horse be accidentally destroyed in any part of the body, the hairs that afterwards grow on that part are always white, because the rete mucosum which tinges those hairs is never regenerated with the skin.

The proximate cause of the whiteness of albinos, and the colour of their eyes, seems therefore pretty evidently to depend on the absence of the rete mucosum: But what is the remote cause?

"In the first place, it seems probable that men affected with this infirmity form a distinct species, for they are produced from parents that have dark skins and black eyes. What is it then that destroys the rete mucosum in such persons? M. Buzzi relates a singular fact, which seems to throw some light on this subject.

A woman of Milan, named Calcagni, had seven sons. The two eldest had brown hair, and black eyes: the third next had white skins, white hair, and red eyes; the last resembled the two eldest. It was said that this woman, during the three pregnancies that produced the albinos, had a continual and immediate appetite for milk, which she took in great quantities: but that when she was with child of the other four children, she had no such desire. It is not however ascertained, that this preternatural appetite was not itself the effect of a certain heat, or internal disease, which destroyed the rete mucosum in the children before they were born.

"The albinos of Chamouni are also the offspring of parents with dark skins and black eyes. They have three fathers by the same father and mother, who are also brunettes. One of them that I saw had the eyes of a dark brown, and the hair almost black. They are said, however, to be all afflicted with a weakness of sight. When the lads are married, it will be curious to observe how the eyes of their children will be formed. The experiment would be particularly decisive if they were married to women like themselves. But this faulty conformation seems to be more rare among women than among men; for the four of Milan, the two of Chamouni, the one described by Maupertuis, the one by Helvetius, and almost all the instances of these singular productions, have been of our sex. It is known, however, that there are races of men and women affected with this disease, and that these races perpetuate themselves, in Guinea, in Java, at Panama, &c.

"Upon the whole, this degeneration does not seem to be owing to the air of the mountains; for though I have traversed the greatest part of the Alps, and the other mountains in Europe, these are the only individuals of the kind that ever I met with."

ALBINUS, a Latin poet, whom Ovid sur-name the Divine. There is now nothing of his extant, except an Elegy on Drafus, and another on the Death of Mecenas.

ALBINUS (Bernhard Siegfried), a celebrated physician and anatomist, was born, of an illustrious family, at Francfort on the Oder in 1697. His father was then professor of the practice of medicine in the university of Francfort, but in the year 1702 he repaired to Leyden, being nominated professor of anatomy and surgery in that university. Here his son had an opportunity of studying under the most eminent masters in Europe, who, from the singular abilities which he then displayed, had no difficulty in prognosticating his future eminence. But while he was distinguished in every branch of literature, his attention was particularly turned to anatomy and surgery. His peculiar attachment to these branches of knowledge gained him the intimate friendship of Ruyffch and Rau, who at that time flourished in Leyden; and the latter, fortunately celebrated as a lithomaniac, is said to have seldom performed a capital operation without inviting him to be present. Having finished his studies at Leyden, he repaired to Paris, where he attended the lectures of Davernay, Vaillant, and other celebrated professors. But he had scarce spent a year there, when he was invited by the curators of the university of Leyden, to be a lecturer in anatomy and surgery in that place. Though contrary to his own inclination, he complied with their request, and upon that occasion was created Dr of physic without any examination. Soon after, upon the death of his father, he was appointed to succeed him as professor of anatomy; and upon being admitted into that office on the 9th of November 1721, he delivered an oration, De vera via ad fabricam humani corporis cognitionem ducere; which was heard with universal approbation. In the capacity of a professor, he not only beheld the greatest attention upon the instruction of the youth entrusted to his care, but in the improvement of the medical art. With this view, he published many important discoveries of his own; and by elegant editions, turned the attention of physicians to works of merit, which might otherwise have been neglected.
neglected. By these means his fame was soon extended over Europe; and the societies of London, Petersburg, and Harlem, cheerfully received him as an associate. In 1745, he was appointed professor of the practice of medicine at Leyden, and was succeeded in the anatomical chair by his brother Fréd. Bern. Albinus. He was twice rector of the university, and as often he refused that high honour when it was voluntarily offered him. At length, worn out by long service and intense study, he died on the 9th of September 1770, in the 74th year of his age.

ALBION, the ancient name of BRITAIN.

New Albion, a name given by Sir Francis Drake to California.

ALBIREO, (in Astronomy) a star of the third or fourth magnitude, in the constellation Cygnus.

ALBIS, (in anc. geog.) now the Elbe, which divided ancient Germany in the middle, and was the boundary of the ancient geography of Germany, so far as that country was known to the Romans: all beyond they owned to be uncertain, no Roman except Drusus and Tiberius having penetrated so far as the Elbe. In the year of the building of the city 744, or about six years before Christ, Domitius Ahenobarbus, crossing the river with a few, merited the ornaments of a triumph; so glorious was it reckoned at Rome to have attempted the passage. In the following age, however, the river that before occupied the middle of ancient Germany, became its boundary to the north, from the immigrations of the Sarmatiae, who policed themselves of the Tranfalb German. The Elbe rises in the borders of Silesia, out of the Rifenberg, runs through Bohemia, Mähia, Upper Saxony, Anhalt, Magdeburg, Bandenburg, Danneberg, Lauenburg, Holstein, and after being swollen by many other rivers, and pailing by Hamburg and Glückstadt, falls into the German, or North sea, to both which places the river is navigable by large vessels.

ALBISOLA, a small town belonging to the republic of Genoa: here is a porcelain manufacture, and several country-houses of the Genoese nobility. It was bombarded in 1745 by the English. E. Long. 8. 20. N. Lat. 44. 15.

ALBAGALERUS, in Roman antiquity, a white cap worn by the famo datus, on the top of which was an ornament of olive branches.

ALBORK, amongst the Mahometan writers, the beast on which Mahomet rode in his journeys to heaven. The Arab commentators give many fables concerning this extraordinary vehicle. It is represented as of an intermediate shape and size between an ass and a mule. A place, it seems, was secured for it in paradise at the intercession of Mahomet; which, however, was in some measure extorted from the prophet, by Albork's refusing to let him mount him when the angel Gabriel was come to conduct him to heaven.

ALBORO, in zoology, a name by which the erythrina, a small red fish, caught in the Mediterranean, is commonly known in the markets of Rome and Venice.

ALBOURG, a town of Denmark, in North Jutland, capital of the diocese of the same name, and a bishop's see. It has this name, which signifies seld-town, on account of the great number of cells taken here. It is seated on a canal, 10 miles from the sea, 30 north of Wiborgh, and 50 north of Arhys. It has an ex-change for merchants, and a safe and deep harbour.

ALBICANIAS. They have a considerable trade in herrings and corn; and an manufacture of guns, pistols, saddles, and gloves. E. Long. 29. 16. N. Lat. 56. 35.

ALBRICTUS, born at London, was a great philosopher, a learned and able physician, and well versed in all the branches of polite literature. He lived in the 11th century, and wrote several works in Latin, particularly, 1. Of the origin of the gods. 2. The virtues of the ancients. 3. The nature of poison, &c.

ALBUCA, BASTARD STAR-OF-BETHLEHEM: A genus of the monogynia order, belonging to the hexandra class of plants; and in the natural method ranking under the roth order, Coronariae. The characters are: The calyx is wanting: The corolla consists of six oval oblong petals, which are persistent: The flamina consists of six three-fided filaments the length of the corolla: Of these, three are fertile, with vertebrate antherae; three are barren, without antherae: The pistillum has an oblong three-fided germen: the stylus is three-fided: The pericarpiun is an oblong obulate triangular capsule, having three cells and three valves. The seeds are numerous, flat, and incumbent. Of this genus Linnaeus reckons only two. Species. 1. The major, or star-flow'wer, with spear-shaped-leaves. This is a native of Canada, and some other parts of North America: the root is bulbous; from whence shoot up eight or ten long, narrow, spear-shaped leaves. In the centre of these arises a flower-item, a foot or more in height, garnished with a loose spke of greenish yellow flowers. After the flowers are pan, the germen swells to a three-cornered capsule, having three cells and with flat seeds. 2. The minor, or African star-flow'er, is a native of the Cape of Good Hope. This hath also a pretty large bulbous root, from which arise four or five narrow awl-shaped leaves, of a deep green colour; the flower-item, which comes from the center of the root, is naked, and rarely arises more than eight or nine inches high, having five or six greenish-yellow flowers, growing almost in the form of an umbel at top: these are rarely succeeded by seeds in Britain.

Culture. The Canada albica is hardy: so the roots may be planted about four inches deep in a border of light earth, where they will thrive and produce their flowers late in the summer: but as the seeds do not often ripen in Britain, and the bulbs put out few offsets, the plants are not common in that country. The African generally flowers twice a year; first in March or April, and again in July or August: and if its roots are kept in pots filled with light earth; sheltered under a hot-bed frame, they will flower even in winter; but the best method is to have a border in the front of a green-house, or stove, where the roots of most of the bulbous flowers may be planted in the full ground, and fereened in winter from frost: in such situations they thrive much better, and flower stronger, than when kept in pots.

ALBUGINEA TUNICAE, in anatomy, the third or innermost coat or covering of the te€les: it is likewise the name given to one of the coats of the eye.

ALBUGINEUS, in anatomy, a term sometimes applied to the aqueous humour of the eye.

ALBUGO, or LEUCOMA, in medicine, a dieterper occasioned
occasioned by a white opaque spot growing on the cornea of the eye, and obstructing vision. See Medicine (Index).

**ALB**

ALBUM, in antiquity, a kind of white table, or register, wherein the names of certain magistrates, public transactions, &c. were entered. Of these there were various sorts; as the album decurionum, album senatorum, album praetorium, &c.

**ALBUM Decurionum**, was the register wherein the names of the decuriones were entered. This is otherwise called matricula decurionum.

**ALBUM Senatorum**, the list of senators names which was first introduced by Augusinus, and renewed yearly.

**ALBUM Praetorium**, that wherein the names of the persons of those decurio who judged at certain times, were entered.

**ALBUM praetoris**, that wherein the formula of all actions, and the names of such judges as the prætor had chosen to decide causes, were written.

The high-priest entered the chief transactions of each year into an album, or table, which was hung up in his house for the public use.

ALBUM is also used, in later times to denote a kind of table, or pocket-book, wherein the men of letters with whom a person has conversed, inscribe their names with some sentence or motto. The famous Albumazar, a learned Arabian physician of the tenth century, who wrote a treatise, Asudi de fapemon, has occasioned a table, which appears to be that anamolous unaccountable compilation wherein his house for the public use.

The white of an egg, according to Boerhaave, makes an extraordinary menstruum. Being boiled hard in the shell, and afterwards suspended in the air by a thread, it resolves and drops down into an impavid, white, milky liquor, which appears to be that inamolous unaccountable menstruum so much used by Paracelsus; and will, though it contain nothing sharp, oleaginous, or sapnaceous, make a thorough solution of myrrh; which is more than either water, oil, spirits, or even fire itself, can effect.

A little purulent white of egg taken into the stomach, occasions a nausea, horror, fainting, vomiting, diarrhoea, and gripes; it inflames the bile, excites heat, thirst, fever; and disfolves the humours like the plague. On the contrary, the white of fresh-laid eggs, if taken while warm from the hen, is extremely nourishing to the infirm; it may be taken in lukewarm milk; but if any other heat is applied to it, the nutritive quality will be destroyed. The fresh white of egg prevents burns from riling in blisters, if it is used immediately after the accident; it mitigates inflammations of the eyes, and preferves the face from sun-burning. In pharmacy, it is used as a medium to render balsams and turpentes, &c. miscible with aqueous fluids; but as it disagreee with many stomachs when thus taken, a medicile of gum arabe may supply its place, it being as good a medium in similar circumstances, and not apt to offend the tenderest stomach. - Whites of eggs are also useful for clarifying liquors; to which purpose, being mixed and incorporated with the liquors to be clariified, and the whole afterwards boiled, the whites of eggs are by this means brought together and hardened, and thus carry off the gross parts of the liquor along with them.

**ALBUQUERQUE**, a small city in Spain, in the province of Estremadura, is seated on an eminence, nine miles from the frontiers of Portugal. It is commanded by an almost impregnable fortress, built on a high mountain, and serving to defend the town. It carries on a great trade in wool and woollen manufactures. It was taken by the allies of Charles king of Spain, in 1705. W. Long. 7. o. N. Lat. 38. 52.

**ALBURN**, the English name of a compound colour, being a mixture of white and red, or reddish brown. Skinner derives the word, in this sense, from the Latin albus, and the Italian burro, from bruno, brown.

**ALBURNUM**, the soft white substance which in trees is found between the liber or inner bark and the wood, and in progress of time acquiring solidity, becomes itself the wood. From its colour and comparatively softness, it has been styled by some writers the fat of trees adeps arborum.

The alburnum is found in largest quantities in trees that are vigorous; though in such as languish, or are sickly, there is a great number of beds. In an oak six inches in diameter, this substance is nearly equal in bulk to the wood. In a trunk of one foot diameter, it is as one to three and a half; of two and a half feet diameter, as one to four and a half, &c. but these proportions vary according to the health and constitution of the trees. - The alburnum is frequently gnawed in pieces by insects which lodge in the substance, and are nourished from it.

**ALBURNUS**, in zoology, a species of the cyprinus of Linnaeus. See Cyprinus.

**ALCA**, or **AUK**, in ornithology, a genus of the order of anseres. The beak of this genus is without teeth, short, convex, compressed, and frequently furrowed transversely; the inferior mandible is gibous near the base; the feet have generally three toes. The species of the alca are 12; of which the most remarkable are,

1. The impennis, northern penguin, or great auk, with a compressed bill furrowed on each side, and an oval spot on each side of the eyes. According to Mr Martin, this bird breeds on the isle of St Kilda; appearing there the beginning of May, and retiring the middle of June. It lays one egg, which is six inches long, of a white colour; some are irregularly marked with purplish lines crossing each other, others blotched with black, and ferruginous about the thicker end: if the egg is taken away, it will not lay another that season. Mr Macaulay informs us that it does not visit that island annually, but sometimes keeps away for several years together; and adds, that it lays its egg close to the sea-mark, being incapable, by reason of the shortness of its wings, to mount higher. The length of this bird, to the end of its toes, is three feet; but its wings are 20 feet, as to be useless for flight; the length, from the tip of the longest quill-feathers to the
the first joint, being only four inches and a quarter.

This bird is observed by seamen never to wander beyond foundings; and according to its appearance they direct their measures, being then assured that land is not very remote. It sometimes frequents the coasts of Norway, the Ferroo isles, Iceland, Greenland, and Newfoundland; and feeds much on the lump-fish, father-lather, and other fish of that size. The young birds eat rofe-root, and other plants. The old ones are very rarely seen on shore, tho' the young ones are not unfrequently met with. It is a very shy bird. It walks ill; but dives well, and is taken in the manner used for the razor-bill and puffin. The skin between the jaws is blown into a bladder, and used for the darts of the Greenlanders, as is also that of some other birds. The skin of the body is supposed to be used by the Equinocuh Indians for garments.

2. The aile, little auk, or black and white diver, with a smooth conical bill, a white streak on the belly and wings, and black feet. The bulk of this species exceeds not that of a black-bird. It is not very common in Britain, being only met with now and then. It seems to be most plentiful towards the north, being met with in various parts as far as Spitzbergen. It is common in Greenland, in company with the black-billed species; feeds on the same food; and lays two bluish white eggs, larger than those of a pigeon. It flies quick, and dives well; and is always dipping its bill into the water while swimming or at rest on the water. It grows fat in the former season, from the waves bringing plenty of crabs and small fish within its reach; but from its size it is less sought after than the others. In Greenland it is called the Ice-bird, being the harbinger of Ice. This species is sometimes seen of a pure white.

3. The arctica, or puffin, with a compressed bill and four furrows; the orbit of the eyes and temples are white. The legs of this species are very small; and placed so far behind as to disqualify it from standing, except quite erect, resting not only on the foot, but the whole length of the leg. This circumstance makes the feet of the puffin from the ground very difficult, and it meets with many falls before it gets on wing; but when that is effected, few birds fly longer or stronger. These birds frequent the coasts of several parts of Great Britain and Ireland; but to place in greater numbers than Priests-holme, where their flocks may be compared to swarms of bees for multitude. These are birds of passage; they return there annually about the fifth or tenth of April, quit the place (almost to a bird), and return twice or thrice before they settle to burrow and prepare for ovation and incubation. They begin to burrow the first week in May; but some few have themselves that trouble, and dislodge the rabbits from their holes, taking possession of them till their departure from the ille. Those which form their own burrows, are at that time so intent on the work as to suffer themselves to be taken by the hand. This task falls chiefly to the share of the males; who also afflict in incubation. The first young are hatched the beginning of July. The old ones show vast affection towards them; and feed totally insensible of danger in the breeding season. If a parent is taken at that time, and suspended by the wings, it will in a fort of despair treat itself most cruelly, by biting every part it can reach; and the moment it is loosed, will never offer to escape, but infantly refer to its unfeigned young; for this affection ceases at the stated time of migration, which is most punctually about the 11th of August, when they leave such young as cannot fly to the mercy of the peregrine falcon, who watches the mouths of the house for the appearance of the little deferted puffins, which, forced by hunger, are compelled to leave their burrows. They lay only one egg. The eggs differ much in form: some have one end very acute; others have both extremely obtuse; all are white. Their flesh is excessively rank, as they feed on sea-weeds and fish, especially sprats: but when pickled and preferred with spices, are admired by those who love high-eating. Dr. Cates tells, that, in his days, the church allowed them in lent, instead of fish: he also acquaints us, that they were taken by means of ferrets, as we take rabbits: at present, they are either dug out, or drawn from their burrows by a hooked stick: they bite extremely hard, and keep such fast hold on whatever they fasten, as not to be easily disengaged. Their noise when taken, is very disagreeable; being like the efforts of a dumberson to speak. These birds are also common in Ireland; on the island Sherris, three leagues N. N. W. of Holyhead; and in the S. Stack, near Holyhead, they breed in plenty. They inhabit Iceland and Greenland; and breed in the extreme parts of the islands. It is found in the Ferroc isles, where it is called Landy; and in the Faroe isles, which is called Goder- nek, from the shape of the bill. It goes also by various other names; such as Golden-head, Battle-axe, and Halegug, in Wales; at Scarborough, Mullet; and in Cornwall, Pope. In America they are said to frequent Carolina in winter; and have been met with in Sandwich Sound by late voyagers: the natives ornament the fore parts and collar of their real-skin jackets with the beaks of them; and those of Aoonalakshka wear gowns of their skins, along with those of other birds. On the coast of Kamtschatka and the Kurilchik islands they are common, even on the Penchikski bay, almost as far as Ochotska: the nations of the two first wear the bills about their necks, and are fastened to fraps, being di- dging to the superstition of those people, their ransom or priest must put them on with a proper ceremony, in order to procure good fortune.

4. The torda, or razor-bill, with four furrows on the bill and a white line on each side running from the bill to the eyes. These birds, in company with the guillemot, appear in the British seas the beginning of February; but do not settle on their breeding places till they begin to lay, about the beginning of May. They inhabit the ledges of the highest rocks that impend over the sea, where they form a grotesque appearance; sitting close together, and in rows one above another. They properly lay but one egg a-piece, of an extraordinary size for the bulk of the bird, being three inches long: it is either white, or of a pale sea-green, irregularly spotted with black: if this egg is destroyed, both the auk and the guillemot will lay another; if that is taken, then a third; they make no nest, depositing their egg on the bare rock; and though such multitudes lay contiguous, by a wonderful instinctq each distinguishes its own. What is also matter of great amazement, they fix their egg on the smooth rock, with so exact a balance, as to secure it from rolling off; yet should
should it be removed, and then attempted to be replaced by the human hand, it is extremely difficult, if not impossible, to find its former equilibrium. According to Mr Latham, it is by means of a cement that the bird fixes its egg. The eggs are food to the inhabitants of the coasts they frequent; which they get with great hazard; being lowered from the top by ropes, trusting to the strength of their companions, whose footing is often so unstable that they are forced down the precipice, and perish together. These birds are found in the north of Europe, also in Iceland, Greenland, and on the coast of Labrador. In Europe they extend along the White Sea into the Arctic Atlantic shores, and from thence to Kamtschatka and the gulph of Ofschotka: it is the only one that reaches the inland Baltic; being found there on the Carls-Ozariles, near Gothland, and the island of Bondenoff Angermania.

5. The pica, or black-billed auk, has the bill of the same form with the torda, but is entirely black. The cheeks, chin, and throat, are white: in all other respects it agrees with the former species. Mr Pennant observes, that it is sometimes found on our coasts; but, according to Mr Latham, it is in the winter season only, when the common form has quitted them. They are said to be met with on the coast of Candia and other parts of the Mediterranean; "where, no doubt (Mr Latham observes) the complete old bird is likewise found, as I have been informed that they are common in the bay of Gibraltar, where it is curious to see their activity under water when pursuing the fish; for, as the water in the bay is sometimes clear for a great depth from the surface, these birds may be often seen as it were flying after their prey, with all the agility of a bird in the air, returning in every direction after the fish, with such wonderful address and dexterity as to elude them of their aim."

6. The eighata of Dr Pallas, or tufted auks, somewhat bigger than the common puffin, and the colours much the same: the bill is an inch and three-quarters in length, the same in depth at the base, and crossed with three furrows: over each eye arises a tuft of feathers four inches in length, which falls elegantly on each side of the neck, reaching almost to the back; and are white as far as they are attached to the head, but afterwards of a fine buff yellow: the legs are of a bright red; the claws black. The female is principally distinguished by having the bill crossed only with two furrows instead of three. This species inhabits the shores of Kamtschatka, the Kurile islands, and those intervening between Kamtschatka and America. In manners it greatly resembles the puffin; living all day at sea, but at no great distance from the rocks; it comes on shore at night; burrows a yard deep under ground, and makes a nest, with feathers and sea-plants; is monogamous, and lodges there the whole night with its mate. It lays one white egg, the end of May or beginning of June, which alone is thought fit to be eaten, the flesh of the bird itself being insipid and hard. It feeds on crabs, shrimps, and shell-fish, which last it forces from the rocks with its strong bill. Pallas remarks, that the Kamtschatkan girls imitate the tufts of these birds, which nature has supplied them with, by placing a similar strip of the white part of the glutton behind each ear, hanging down behind by way of ornament; and is a well-received present from a lover to his mistress. The bills both of this and the common puffin were formerly held by the natives as a charm, and worn by the priests as amulets; indeed at the present these have been seen fixed round their head dreads, but supposed now to be only effected as mere ornaments: the skins are however made use of for clothing, being fewed together. It is called in Kamtschatka, Mischaquarika, and in Ofschotka, ilema.

7. The puffacula, or perroquet auk, of Dr Pallas; is about the size of the little auk. The bill is much compressed on the sides, in shape convex both above and below, and of a bright red colour: from the remote corner of each eye is a very slender tuft of fine white feathers, hanging down the neck: the head and upper part of the body are dusky; the lower whiten, varied with black edges: the legs are of a dirty yellow; and the webs dusky. This species is found at Kamtschatka, in the isles towards Japan, and on the western shores of America. They are sometimes seen in flocks, but seldom far from land, except driven by storms. They build their harbours in the crevices of rocks. They lay an egg almost the size of a hen's, of a dirty white or yellowish colour spotted with brown; which they do about the middle of June, upon the bare rock or sand, for they make no nest. Like most of the tribe, they are stupid birds, as may be evinced by the ridiculous method of catching them:—One of the natives places himself under a loose garment of fur, of a particular make, with large open sieves, among the rocks, at evening; when the birds, returning to their lodging places, sit alone, run under the skirts, and up the arm-holes, for shelter during the night; and thus become an easy prey. Their stupidity likewise occasions them to fly aboard a ship at such times, mistaking it for a roosting-place; whereby navigators have been taught to avoid the danger of falling in too near with land, either of evenings, or on approaching storms. The eggs are esteemed good.

ALCIÆUS, a famous ancient lyric poet, born at Mitylene, in the island of Lesbos. Horace seems to think him the inventor of this kind of poesy:

Now the Roman muse inspire,
And warm the song with Grecian fire. Francis.

He flourished in the 44th Olympiad, at the same time with Sappho, who was likewise of Mitylene. Alcaeus was a great enemy to tyrants, but not a very brave soldier. He was present at an engagement, wherein the Athenians gained a victory over the Lesbians; and here, as he himself is said to have confessed in one of his pieces, he threw down his arms, and saved himself by flight. Horace, who, of all the Latin poets, most resembled Alcaeus, has made the like confession:

With thee I saw Philippi's plain,
Its fatal rout, a fearful scene!
And dropp'd, alas! th' ignobles shield,
Where valour's self was forc'd to yield;
Where foil'd in dust the vanquish'd lay,
And breath'd th' indignant soul away. Francis.

The poetical abilities of Alcaeus are indisputé; and though
Alcaic. 

Alcaeus, though his writings were chiefly in the lyric strain, yet his muse was capable of treating the sublimest subjects with a suitable dignity. Hence Horace says,

Alcaeus strikes the golden firings,  
And fees, and war, and exile sings.  
Thus while they strike the various lyre,  
The ghosts the sacred sounds admire:  
But when Alcaeus lifts the strain  
To deeds of war and tyrants slain,  
In thicker crowds the shadowy throng  
Drink deeper down the martial song. Francis.

Alcaeus, an Athenian tragic poet, and, as some think, the first composer of tragedies. He renounced his native country Mitylene, and passed for an Athenian. He left ten pieces, one of which was Passiphæa, that which he produced when he disputed with Aristophanes, in the fourth year of the 97th Olympiad.

There is another Alcaeus mentioned in Plutarch, perhaps the same whom Porphyrius mentions as a composer of faricales and epigrams, and who wrote a poem concerning the plagiarisms of Euphorus perhaps the same whom Persius, a poet of satirical iambics and epigrams, and who lived in the reign of Vespasian and Titus. We know not which of these it was who suffered for his宽容; a very large head, which Juvenal alludes to:

This is Alcaeus's tomb; who died by a radish,  
The daughter of the earth, and punisher of Adulterers.  
This punishment inflicted on adulterers, was thrusting one of the largest radishes upon the anus of the adulterer; or, for want of radishes, they made use of a fish with a very huge head, which Juvenal alludes to:

Quodquam multae et magis in trast. Sat. x.  
The mullet enters some behind.

Hence we may understand the menace of Catullus.

Ah! tua tu misera, malique fiat,  
Quem attrahis pedibus, pennis porta,  
Percurrent raphanum magnoque.  
Epig. xv.  
Ah! wretched thou, and born to luckless fate,  
Who art discover'd by the unfruit gate!  
If once, alas! the jealous husband come,  
The radish or the sea-fish is thy doom.

Alcaics, in ancient poetry, a denomination given to several kinds of verse, from Alcaeus, their inventor.

The first kind consists of five feet, viz. a spondee, or iambic; an iambic; a long syllable; a dactyl; another dactyl: such is the following verse of Horace,

Omnem eodem cognitum omnium
Verfum ur habet ferius ocular.  
Sors exiuitra.

The second kind consists of two dactyls and two trochees: as,

Exilium imposuit cymbae.  
Besides these two, which are called dactylic Alcaics, there is another dactylic Alcaic; consisting of an iambus, a choriambus; another choriambus; and a bacchus; the following is of this species,

Cur timent flatum Thierim tanger, cur olim sp.  

Alcaic Odes, a kind of many ode composed of several strophes, each consisting of four verses; the two first of which are always Alcaics of the first kind; the third verse is a diameter hypermetrical, or consisting of four feet and a long syllable; and the fourth verse is an Alcaic of the second kind. The following strophe is of this species, which Horace calls minores Alcaic canons.

Non posse dem multa vocaveris  
Relle beantum: relictus occupat  
Nomen beati, qui deorum  
Maneriis sapienter uti, &c.

Alcaid, Alcayde, or Alcalde, in the polity of the Moors, Spaniards, and Portuguese, a magistrat, or officer of justice, answering nearly to the French provost, and the British justice-of-peace. The alcaid among the Moors is vested with supreme jurisdiction, both in civil and criminal cases.

Alcala de Guadeira, a small town of Spain, in Andalusia, upon the river Guadeira. Here are the observances, from whence they convey water to Seville by an aqueduct. W. Long. 6. 10. N. lat. 37. 15.

Alcala de Henares, a beautiful and large city of Spain, in New Castile, seated upon the river Henares, which washes its walls. It is built in a very agreeable plain, and is of an oval figure. The streets are handsome and pretty straight; one of them is very long, running from one end of the city to the other. The houses are well built, and there are several squares, the largest of which is an ornament to the city; it is surrounded on all sides with piazzas, where tradesmen have their shops to expose several sorts of commodities to sale, of which there is a great plenty and variety as in most towns of Spain. The university was founded by cardinal Ximenes, archbishop of Toledo, about the beginning of the 16th century. The land about Alcala is watered by the Henares, well cultivated, and very fruitful, while that at a distance is dry and sterile: it yields grain in plenty, very good mufcat wine, and melons of a delicious kind. Without the walls is a spring, the water of which is so pure and so well tafted, that it is collected and sent up for the king of Spain's own use, from whence it is carried to Madrid. This city is 10 miles south-west of Guadalaxara, and 13 miles east of Madrid. W. Long. 4. 20. N. Lat. 40. 30.

Alcala Real, a small city of Spain, in Andalusia, with a fine abbey. It is built on the top of a high mountain, in a mountainous country; and the road to it is incommodious, rough, and unequal; but to make amends for this, here are several kinds of exquisite fruit and wine. W. Long. 4. 15. N. Lat. 37. 18.

Alcaly, or Alcali, Sec Chemisty, Index.

Alcanis, a town of Arragon in Spain, seated on the river Guadaloupe, twelve miles from Cape. It was formerly the capital of the kingdom of the Moors; but being taken from them, it was made a commendary of the order of Calatrava. Here is a very remarkable fountain, which throws up water through 42 pipes. It is surrounded with gardens and fruit-trees, and defended with a good fortef. W. Long. 6. 5. N. Lat. 41. 0.

Alcanna, in commerce, a powder prepared from the
the leaves of the Egyptian privet, in which the people of Cairo drive a considerable trade. It is much used by the Turkish women to give a golden colour to their nails and hair. In dying, it gives a yellow colour when steeped with common water, and a red one when infused in vinegar. There is also an oil extracted from the berries of alcanna, and used in medicine as a calmer.

Alcántara, a small, but very strong city of Estremadura, in Spain. It gives name to one of the three orders of knighthood. It is fleated on the banks of the Tajo, or Tagus, 21 miles from Coria, in a very fruitful soil, and is celebrated for its bridge over that river. This was built in the time of the emperor Trajan, as appears by an inscription over one of the arches, by the people of Lusitania, who were affeated to supply the expence. It is raised 200 feet above the level of the water; and though it consists but of six arches, it is 670 feet in length, and 28 in breadth. At the entrance of the bridge, there is a small antique chapel hewn in a rock by the ancient Pagans, who dedicated it to Trajan, as the Christians did to St. Julian. This city was built by the Moors, on account of the convenience of this bridge; which is at a place where the Tajo is very deep, running between two high steep rocks; for this reason, they called it Alcántara, which, in their language, signifies the Bridge. It was taken from them in 1214, and given to the knights of Calatrava, who afterwards assumed the name of Alcántara. It was taken by the Earl of Galloway, in April, 1706, and retaken by the French in November following. It is 45 miles from Madrid, and 125 from Seville. W. Long. 7° 12'. N. Lat. 39° 30'.

Knights of Alcántara, a military order of Spain, which took its name from the abovementioned city. They make a very considerable figure in the history of the expeditions against the Moors. The knights of Alcántara make the same vows as those of Calatrava, and are only distinguished from them by this, that the croc fleur de lys, which they bear over a large white cloak, is of a green colour. They possess 37 commanderies. By the terms of the surrender of Alcántara to this order, it was stipulated, that there should be a community between the two orders, with the same practices and observances in both; and that the order of Alcántara should be subject to be visited by the grand-master of Calatrava. But the former soon released themselves from this engagement; on pretence that their grand-master had not been called to the education of that of Calatrava, as had been likewise stipulated in the articles. After the expulsion of the Moors, and the taking of Granada, the sovereignty of the order of Alcántara and that of Calatrava was settled in the crown of Castile by Ferdinand and Isabella.—In 1540, the knights of Alcántara sued for leave to marry, which was granted them.

Alcázar, a small city of La Mancha, in Spain, defended by a strong castle, and remarkable for an ancient aqueduct. It stands near the river Guadarrama, and the soil about it is very fruitful. They have a breed of little running-horses, which are very fleet and strong. It is 25 miles north of the confines of Andalucía, 108 south of Cuenca, and 130 south-east of Madrid. W. Long. 1° 50'. N. Lat. 38° 28'.

Alcázar do Sal, a town of Portugal, in Estremadura, which has a castle said to be impregnable. It is indeed very strong, both by art and nature, being built on the top of a rock which is exceedingly steep on all sides. Here is a saltpit which produces very fine white salt, from whence the town takes its name. The fields produce large quantities of a sort of rushes, of which they make mats, which are transported out of the kingdom. W. Long. 9° 16'. N. Lat. 38° 18'.

Alcâsaar, a city of Barbary, seated about two leagues from Larache, in Algeciras, a province of the kingdom of Fez. It was of great note, and the seat of the governor of this part of the kingdom. It was built by Jacob Almanzor, king of Fez, about the year 1180, and designed for a magazine and place of rendezvous for the great preparations he was making to enter Granada in Spain, and to make good the footing Joseph Almanzor had got some time before. It is laid his father first invaded Spain with 300,000 men, most of whom he was obliged to bring back to Africa to quiet a rebellion that had broke out in Morocco. This done, he returned to Spain again with an army, as is said, of 200,000 horse and 300,000 foot. The city is now fallen greatly to decay, so that of fifteen miles from the confines of Spain, and to the south of Cuenca, and

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ted to it likewise the declension of agriculture, it being imposed not only upon manufactures, but upon the rude produce of the land.

ALCAZAR LEGUE, a town of Africa, in the kingdom of Fez, and in the province of Idrarab. It was taken by Alphonsus, king of Portugal, in 1486; but soon after that, it was abandoned to the Moors. It is seated on the coast of the straits of Gibraltar.

W. Long. 5° 30'. N. Lat. 38° 0'.

ALCAZAR, a town of Spain, in New Castile, seated on the river Guadarrama, which has a fortress on a high hill for its defence, and lies in a very fruitful country. It is 700 miles north-west of Carthagena.

W. Long. 2° 10'. N. Lat. 38° 15'.

ALCE, ALCES, or EK, in zoology, the trivial name of a species of the cervus, belonging to the order of mammalia pecora. See CERVA.

ALCEA, the HOLLY-HOCK: A genus of the polyandrria order, belonging to the monadelphia class of plants; and in the natural method ranking under the 37th order, Columniferae. The characters are: The calyx is a double perianthium, monophyllous and perifephalous; the exterior one is five-cleft, the interior half five-cleft: the corolla consists of five petals, coaleced below into a five-cornered cylinder, loose above, and inferior into the corolla; the antherae are kidney-shaped: The pistillum has a roundish gnomen; a short cylindrical stylus: and numerous filiform stigma: The flower is of the same kind as a common flax flower, joined into a verticillum about a columnar depressed receptacle: The seeds are solitary, reniform, and deprived.

Species. Although Linneus mentions two distinct species of this genus, viz. the rubra and flofifolia, he thinks, that the latter may perhaps be only a variety of the former; but Mr Miller affirms them to be distinct species, whose difference in the form of their leaves always continues. The leaves of the first sort are round, and cut at their extremities into angles; those of the second are deeply cut into five or seven segments, so as to resemble a hand. Cultivation produces almost an infinite variety of this plant, such as double-flowered, single-flowered, deep red, pale red, blackish red, white, purple, yellow, and flesh-colour. The first species is a native of China, the second grows also in India. The natives of warm countries, they are hardly enough to thrive in the open air in Britain, and have for many years been some of the greatest ornaments in gardens, towards the end of summer; but they have the inconvenience of growing too large for small gardens, and requiring tall stakes to secure them from being broken by strong winds. In large gardens, however, when properly disposed, they make a fine appearance; for as their spikes of flowers grow very tall, there will be a succession of them on the same stems more than two months: the flowers on the lower part of the spike appear in July; and as their stalks advance, new flowers are produced till near the end of September. When planted in good ground, the stalks will often rise to the height of eight or nine feet; so that near six feet of each will be garnished with flowers, which, when double and of good colours, make a very beautiful appearance.

Culture. The holly-hock is propagated by seeds, which should be carefully sown from those plants whose flowers are double and of the best colours: for though the duplicity of the flowers, as well as their colour, are only accidental properties, yet the young plants will produce nearly the same kind of flowers with those from which the seeds are taken, provided no plants with single or bad-coloured flowers are permitted to grow near them; and as soon as such appear they ought to be removed from the good ones, that their fatina may not spread into the others, which would cause them to degenerate. The seeds ought to be gathered very dry, and remain in their capsules till springs; but care must be taken that no wet comes to them in winter, otherwise the covers would turn mouldy, and spoil their contents.—They should be sown in little hills, about the middle of April, on a bed of light earth, and covered with earth of the same kind about half an inch deep. When the plants have put out six or eight leaves, they should be transplanted into nursery-beds, observing to water them until they have taken good root; after which they will require no further care, but to keep them clean from weeds till October, when they should be transplanted where they are to remain.

ALCEDO, or KINGFISHER, in ornithology, a genus of the order of picas. The alcedo has a long, flat, thick, triangular bill; with a fleshy, plain, short, flat tongue.

Of this genus there are a great many species, with one or other of which almost every part of the world is furnished. Most of them frequent rivers, and live on fish, the singularity of catching which is admirable; sometimes hovering over the water, where a shoal of small fishes is seen playing near the surface; at other times waiting with attention, on some low branch hanging over the water, for the approach of a single one who is so unlucky as to swim that way; in either case dropping like a stone, or rather darting with rapidity on his prey; when seizing it crostwise in his bill, it retires to a retired place to feast on it; which it does piecemeal, bones and all, without reserve, afterwards bringing up the indigestible parts in pellets, like birds of prey. The wings of most of the genus are very short; yet the birds fly rapidly, and with great strength. It may be remarked, that throughout this genus, blue, in different shades, is the most predominant colour. The species found in the South Sea Islands are held in a kind of superstitious veneration by the natives of the places they severally inhabit, perhaps on account of their being frequently seen flying about the morais or burial-places. That which inhabits Otaheite, where it is called Enoro, is accounted particularly sacred, and not allowed to be taken or killed.

r. The ifipida, or common kings-fisher, is not much larger than a swallow; its shape is clumsy; the bill disproportionally long; it is two inches from the base to the tip; the upper cham black, and the lower yellow. But the colours of this bird alone for its inelegant form: the crown of the head and the coverts of the wings are of a deep blackish green, spotted with bright azure; the back and tail are of the most refulcent azure; the whole under-side of the body is orange-coloured; a broad mark of the same pales from the bill beyond the eyes; beyond that is a large white spot; the tail is short, and consists of twelve feathers of a rich deep-blue.
It was therefore necessary to place it in a tranquil sea, and to supply the bird with charms to allay the fury of a turbulent element during the time of its incubation; for it had, at that season, power over the seas and the winds.

May Halcyons smooth the waves, and calm the seas, and the rough south-east sink into a breeze; Halcyons, of all the birds that haunt the main, most lov'd and honour'd by the Nereid train.

These birds were equally favourites with Thetis as with the Nereids.

Dilectae Thetidæ Halcyones. VIRG. GEORG. I. 399.

as if to their influence these deities owed a repose in the midst of the storms of winter, and by their means were secured from those winds that disturb their submarine retreats, and agitated even the plants at the bottom of the ocean.

Such are the accounts given by the Roman and Sicilian poets. Ariosto and Pliny tell us, that this bird is most common in the seas of Sicily: that it sat only a few days, and those in the depth of winter; and during that period the mariner might fall in full security; for which reason they were styled Halcyon days.

Perque dies placidos hiberno tempore septem
Incubat Halcyone pendentibus aquore nidos:
Tum via tua maris: ventos uss fidet, et arce
Æolus egregius.

OVID. MET. lib. xi.

Alcyone, compress'd,
Seven days sits brooding on her watery nest,
A wintry queen; her fire at length is kind,
Calm's every form, and hushes every wind.

DRYDEN.

In after-times, these words expressed any season of prosperity: these were the Halcyon days of the poets; the brief tranquillity, the septem placent dies, of human life.

The poets also made it a bird of song. Virgil seems to place it in the same rank with the linnet;

Littoraque Halcyonem refonant, et Acantida dum.

GEORG. III. 338.

And Silius Italicus celebrates its music, and its floating nest:

Cum fonat Halcyone cantra, nidosque natantes
Immota gelat fissitis fluctibus unda.

Lib. xiv. 275.

But these writers seem to have transferred to our species, the harmony that belongs to the vocal alcódenote, one of the loft birds of the ancients.

As the ancients have had their fables concerning this bird, to have the modern vulgar. It is an opinion generally received among them, that the fleece of the kings-fisher will not corrupt, and that it will even banish all vermin. This has no better foundation than that which is said of its always pointing, when hung up dead, with its breast to the north. The only truth which can be affirmed of this bird when dead is, that

* Plin. lib. xxi. c. 8. of this seems to be founded on truth. The form of the nest is justly decried; and the materials which Ariosto says it was compofed of, are not entirely of his own invention. Whoever has seen the nest of the kings-fisher, will observe it fixed with the bones and scales of fish; the fragments of the food of the owner, and its young.—On the foundation laid by the philosopher, succeeding writers formed other tales extremely absurd; and the poets, indulging the powers of imagination, defribed the story in all the robes of romance. This nest was a floating one:

Incubat halcyonem pendentibus aequore nidos.

OVID. MET. lib. xi.
Alcedo. its flesh is utterly unfit to be eaten; while its beautiful plumage preferable to that of any other bird we know.

This bird is found not only in Britain, but throughout Europe, Asia, and Africa; as specimens have been received from both China, Bengal, and Egypt. Besong also remarks its having met with it in Romania and Greece; and Scopoli notices it as a bird of Carolina, where he says it remains the whole year as in different climates, being alfoil of its not alllIl by the block, and feeds on frogs, and thighs are whitish, marked with longitudinal broad stripes: and the claws are black. This species is found both in Guiana and Brazil, in the moist woods which it prefers to the more dry spots, for the sake of insects, on which it feeds. It is seldom seen exceptingle, as it is a very solitary bird, keeping for the most part in the thicker parts; its flight quick, but short; perches on branches of a middling height, where it sits all night, and frequently parts of the day, without flitting. Though these birds are solitary, yet they are far from scarce, as many may be met with. They are said to have a short and agreeable note. The natives of Guiana call this bird Venenore and the Creoles, Colibres grands bois. At Brazil their flesh is eaten by fome.

2. The rudis, or Egyptian kings-fisher, as described by Blauffe (*Egretta caudata*), is the size of the Roydon crow. The bill is blackish, more than half an inch broad at the base, and two inches in length: the head, shoulders, and back, are brown, marked with oblong ferruginous spots: the throat is of a ferruginous white: the belly and thighs are whitish, marked with longitudinal broad ferruginous spots: upper tail coverts are quite white: the quills spoted with white on the inner webs, chiefly at the tips: the tail is ash-coloured: the legs are of a palette green; and the claws blackish. It inhabits lower Egypt, about Cairo; builds in fycamore and date trees; and feeds on frogs, insects, and small fishes, which it meets with in the fields when they are overflood. Its cry is not unlike that of the common crow.

3. Le taparara of Buffon is about the size of a starling. The upper mandible of the bill is black; the lower red: the hind part of the neck, the back, and scapulars, are of an elegant blue; the rump and upper tail coverts bright beryl-blue: the under parts of the body are white: the wing coverts blue; and the legs red. It inhabits Cayenne and Guiana, at which last place the natives call all the kings-fishers tribe by the name Taparara. In this part of South America, which contains many rivers full of fish, kings-fishers, as might be expected, abound in vast numbers: but what is remarkable, they never herd together, always being found alone, except in breeding-time, which is about the month of September. They lay their eggs in the holes of banks, like the kings-fisher of Europe. The cry of this bird imitates the word Caraca.

4. The torquata, or cinereous kings-fisher, is about the size of a magpie, and fifteen inches and a half in length. The bill is three inches and a half long, and brown: the base of the lower mandible reddish: the head is crested: the upper parts of the head and body are blueish ash: the upper parts chefu: the throat is whitish, defending down the neck, and palling behind like a collar, ending towards the back in a pale green: the under tail coverts are of a plain fulvous, transfusely ftriated with black: the greater wing coverts varied with blueish, ash, black, and yellowish: the legs are red; and the claws blackish. It inhabits Martinique and Mexico; at which last it is called *darkula*_spinex*. This bird migrates into the northern parts of Mexico at certain seasons only, and is supposed to come there from some hotter parts.

5. The galbula, or green jacamar, is about the size of a lark. The bill is black, of a square form, a little incurvated and sharp at the point: the plumage in general, in the upper part of the body, is of a most brilliant green, glossed with copper and gold in different lights: the belly, throat, and vent, are rufous: the tail is composed of ten feathers, and shaped like a wedge: the legs are of a greenish yellow, very short and weak: the claws are black. This species is found both in Guiana and Brazil, in the moist woods which it prefers to the more dry spots, for the sake of insects, on which it feeds. It is seldom seen exceptingle, as it is a very solitary bird, keeping for the most part in the thickest parts; its flight quick, but short; perches on branches of a middling height, where it sits all night, and frequently parts of the day, without flitting. Though these birds are solitary, yet they are far from scarce, as many may be met with. They are said to have a short and agreeable note. The natives of Guiana call this bird Venenore and the Creoles, Colibres grands bois. At Brazil their flesh is eaten by fome.

6. The paradisaea, or paradise jacamar, is of the same size with the former, and has a similar bill: the throat, fore part of the neck, and under wing coverts are white: the rest of the plumage is of a deep dull green, in some lights appearing almost black, in other with a flight glos of violet and copper bronze: the tail is composed of twelve feathers of unequal lengths: the two middle ones longest: the legs are black; the toes are placed two before and two behind, and prettily united. It inhabits Surinam; and like the others, it feeds on insects; and sometimes, contrary to them, frequents open places. It flies farther at a time, and perches on the tops of trees: It is frequently found with a companion, not being quite so solitary a bird as the other. It also differs in the note, having a kind of soft whistle often repeated, but not heard a great way off.

Above 30 other species have been described by ornithologists.

ALCHEMILLA, or LADIES-MANTLE: A genus of the monogynia order, belonging to the tetradria class of plants; and in the natural method ranking under the 35th order *Seniciose*. The calyx is a single-leafed petiole, tubular, and persistent; the mouth, flat, and eight-parted: There is no corolla. The flower consists of four small erect tubular filaments placed in the mouth of the calyx; the anthers are rounded: The pistil has an egg-shaped germen: The flower is filiform, the length of the stamens, and inserted at the base of the germen. The stigma is globular. There is no perianth; but the neck of the calyx closed. The seed solitary, elliptical, and compressed. Of this genus there are three species.
ALCHYMIST. ALCHEMIST, a practitioner in alchemy.

ALCHEMISTRY, that branch of chemistry which had for its principal objects the transmutation of metals into gold; the panacea, or universal remedy; an alka-hef, or universal menstrum; an universal ferment; and many other things equally ridiculous.

Kircher, instructed in all the secrets of chemistry, has fully exposed the artifices and impostures of alchemists. An alchemist puts into a crucible the matter which is to be converted into gold; this he sets on the fire, blows it, sifts it with rods; and, after divers operations, gold is found at the bottom of the crucible, instead of the matter first put in: this there are a thousand ways of effecting, without any transmutation. Sometimes it is done by dexterously dropping in a piece of gold concealed between the fingers, sometimes by calling in a little of the dust of gold or silver disguised under the appearance of some elixir, or other indifferent matter; sometimes a crucible is used which has a double bottom, and gold put between the two; sometimes the rod used to sift the matter is hollow, and filled with the dust of the metal desired; at other times there is metal mixed with the charcoal, the ashes of the furnace, or the like. Mr Harris very properly distinguishes between alchemy and chemistry; and defines the former to be ars fere arte, exquisitio principiis effentiarum, medium laborare, et finis mendicare; and the latter has a proverb, non sibi fidare alchemista pro verbo o mediceo amalato. The ruin which has attended this delusion has occasioned several flats to make severe laws against pretences to alchemy. The Romans formerly banished all such as professed it; and the sacred censers like wife directed the thunder of their censure against them. Dioclian and Caesar directed all books which treated of this subject to be burnt. By modern furnishers with a licence for practicing alchemy, with all kinds of metals and minerals, granted to one Richard Carter in the year 1476 Rumm. Fec. tom. xii. Nevertheless, we have had severer laws against alchemy and multiplying of metals, as much for as against coin ing of dikes.

ALCIAT (Andrew), a great lawyer, who flourished in the 16th century, born at Milan. He mixed much of police learning in the explication of the laws, and happily drove out the barbarity of language which till then had reigned in the lectures and writings of lawyers; for which Thuanus highly praises him. He published a great many law-books, and some notes upon Tacitus. His Emblems have been much admired, and translated into French, Italian, and Spanish; and several learned men have written commentaries on them.

ALCIBIADES, an Athenian general. It was the fate of this great man to live at a time when his country was a scene of confusion. The Greeks, grown infatuated from their conquests in Persia, turned their arms against each other, and banded together under the conduct of the two most oppugnant states Athens and Lacedaemon. Alcibiades, in the midst of an expedition he had planned against the enemy of his country, was recalled home to answer some charge of a private nature; but fearing the violence of his enemy, instead of going to Athens, he offered his services at Sparta, where they were readily accepted. By his advice the Lacedaemonians made a league with Persia, which gave a very favourable turn to their affairs. But his credit in the republic raising jealousies against him, he privately reconciled himself to his country, and took again the command of an Athenian army. Here victory waiting as it were at his command, attended all his motions. The loss of seven battles obliged the Spartans to sue for peace. He enjoyed his triumphs, however, only a short time at Athens. One unsuccessful event made him again obnoxious to the malice of his citizens; and he found it expedient to retire from Athens. In his absence the Spartans again took the lead, and at the fatal battle of Areus entirely subdued the Athenian power. Alcibiades, though an exile, endeavored to restore the power of his country; of which the Spartans having intelligence, procured him to be assassinated. He was a man of admirable accomplishments, but indifferently principled: of great parts; and of an amazing veracity of genius.

ALCINOUS, king of the Phoenicians, in the island now called Corfu, was son of Nausithous, and grandson of Neptune and Peribea. It is by his gardens this king has chiefly immortalized his memory. He received Ulysses with much civility, when a storm had cast him on his coast. The people here loved pleasure and good cheer; yet were fruitful seamen; and Alcimus was a good Prince.

ALCMAER, a city of the United Provinces, seated in North Holland, about four miles from the sea, 15 from Haerlem, and 18 from Amsterdam. It is a handsome city, and one of the cleanest in Holland. The streets and houses are extremely neat and regular, and the public buildings very beautiful. It had formerly two parli-churches, dedicated to St Matthew and St Lawrence. The latter had to high a tower, that it served for a sea-mark to the ships that were in the open sea; but, in 1644, it tumbled down and damaged the other church so much, that they were both
broad demolished in 1470, and one church was built in
their stead, dedicated to the same saints. The Spaniards,
under the command of Frederick of Toledo, son of the
duke d'Alva, came to besiege it, after they had taken
Haarlem in 1573; but were forced to raise the siege,
after three months lying before it, as well on account
of the infection of the air as the stout resistance of the
inhabitants and soldiers; even the women signalized
themselves bravely in its defence. It is recorded in
the register of this city, that, in the year 1637, 120
tulips, with the off-sets, sold for 90,000 florins. The
town has a very good trade in butter and cheese, of
which a vast quantity is sold every year, and is effec-
tually held in Holland, E. Long. 4. 26. N. Lat.
52. 28.

ALCMAN, a lyric poet, who flourished in the 27th
Olympiad. He was born at Sparta; and composed
several poems, of which only some fragments are re-
maining, quoted by Athenaeus and some other ancient
writers. He was a very amorous: accounted the father
of gallant poetry; and is said to have been the first that
introduced the custom of singing love--songs in com-
pany. He is reported to have been one of the great-
citizens of his age; upon which Mr. Boyle remarks
that such a quality would have been extremely in-
convenient, if poetry had been at that time upon such
a footing as it has been once, not being desirable to
procure the poet bread. He died of a sanguine disease;
for he was eat up with lice.

ALCMANIAN, in ancient lyric poetry, a kind of
verse consisting of two dactyles and two trochees; as,-

Virginius putrifiquecuntu.

The word is formed from ALCMAN, the name of an an-
cient Greek poet, in great esteem for his erotic or
amorous composition.

ALCMIENA, the daughter of Eleersyo king of My-
ceniae, and wife of Amphiryon. Jupiter putting on the
shape of her husband while he was abroad in the wars,
begot Hercules upon her: he made that night as long
as three ordinary ones.

ALCock (John), doctor of laws and bishop of
Ely in the reign of king Henry VII. was born at Be-
verly in Yorkshire, and educated at Cambridge. He was
first made dean of Westminister, and afterwards ap-
pointed master of the rolls. In 1471, he was con-
secrated bishop of Rochester. 1476, he was trans-
ferred to the see of Worcester; and in 1486, to that of Ely,
in the room of Dr John Morton, preferred to the see
of Canterbury. He was a prelate of great learning and
piety; and so highly esteemed by king Henry,
that he appointed him lord president of Wales, and
afterwards lord chancellor of England. Alcock foun-
ded a school at King'ston upon Hull, and built the spa-
cious hall belonging to the episcopal palace at Ely.
He was also the founder of Jesus-college in Cambridge
for a master, six fellows, and as many scholars. This
house was formerly a nunnery, dedicated to St Rad-
gund; and, as Godwin tells us, the building being
decayed, and the revenues reduced almost to nothing,
the nuns had all forsworn it except two, whereupon bishop Alcock procured a grant from the
queen, and converted it into a college. But Camden
and others tell us, that the nuns of that house were
so notorious for their incontinence, that king Henry VII.
and pope Julius II. consented to its dissolution:

Bale accordingly calls this nunnery spiritualis here-
trium cum ordinis communitas, an community of spiritual harlots.

Bishop Alcock wrote several pieces; amongst which are
the following:

1. Nonn Perfectionis. 2. In Salmos nententialis. 3. Homilae Vulgares. 4. Meditations
Par. He died October 1, 1500; and was buried in
the chapel he had built at Kingston upon Hull.

ALCOHOL, or ALCOOL, in chemistry, spirit of
wine highly rectified. It is also used for any highly
rectified spirit. It is a strong antiseptic, and therefore em-
ployed to preserve animal substances.

ALCOHOL is also used for any fine impalpable
powder.

ALCOHOLIZATION, the process of rectifying
any spirit. It is also used for pulverization.

ALCOR, in astronomy, a small star adjoining to
the large bright one in the middle of the tail of arfa
major. - The word is Arabic. It is a proverb among
the Arabians, applied to one who pretends to see small
things, but overlooks much greater: Thou canst see Al-
cor and not yet see the full moon.

ALCORN, or AL-koran, the scripture, or bible,
of the Mahometans. The word is compounded of the
Arabic particle al, and koran or kara, from the verb
car or karas, to read. The word therefore properly signifies, the reading; or rather, that
which ought to be read. By this name the Mahometans
declare not only the entire book or volume of the Koran,
but also any particular chapter or section of it: just as
the Jews call either the whole scripture, or any part of
it, by the name of Karah, or Mikra, words of the
name origin and import.

Besides this peculiar name, the Koran is also honoured
with several appellations common to other books of
scripture: as, al Farkan, from the verb farka, to
divide or distinguish; not, as the Mahometan doctors
say, because those books are divided into chapters or
sections, or distinguished between good and evil; but in
the same notion that the Jews use the word Perek, or
Pirka, from the same root, to denote a section or portion
of scripture. It is also called al Mosbaf, the vo-
ume, and al-Kitab, the book, by way of eminence,
which answers to the Bible of the Greeks; and al
Dhikr, the adoration, which name is also given to the
Pentateuch and Gospel.

The Koran is divided into 114 larger portions of very
unequal length, which we call chapters; but the Ara-
bians name, in the singular fura; a word rarely used
on any other occasion, and properly signifying a row,
order, or a regular series; as a course of bricks in
building, or a rank of soldiers in an army; and is the
name in use and import with the Sura, or Tora, of the
Jews, who also call the fifty-three sections of the Pen-
tateuch Sedarim, a word of the same signification.

These chapters are not, in the manuscript copies, dis-
finguished by their numerical order, but by particular
titles, which are taken sometimes from a particular
matter treated of, or person mentioned therein; but
usually from the first word of note, exactly in the same
manner as the Jews have named their Sedarim; though
the word from which some chapters are denominated
be very far distant, towards the middle, or perhaps
the end, of the chapter: which seems ridiculous. But the
occasion of this appears to have been, that the verb of
passage
Alcoran. 
passage wherein such word occurs, was, in point of time, revealed and committed to writing before the other verses of the same chapter which preceded it in order; and the title being given to the chapter before it was completed, or the passages reduced to their present order, the verse from whence such title was taken did not always happen to begin the chapter. Some chapters have two or more titles, occasioned by the difference of the copies. 

Some of the chapters having been revealed at Mecca, and others at Medina, the noting this difference makes a part of the title: but the reader will observe, that several of the chapters are said to have been revealed partly at Mecca and partly at Medina; and, as to others, it is yet a dispute among the commentators to which of the two places they belong.

Every chapter is subdivided into smaller portions, of very unequal length also, which we customarily call verses; but the Arabic word is ajza, the same with the Hebrew ajza, and signifies figura or wonder: such as are the secrets of God, his attributes, works, judgments, and ordinances, delivered in those verses; many of which have their particular titles also, imposed in the same manner as those of the chapters. 

Besides these unequal divisions of chapter and verse, the Mahometans have also divided their Koran into sixty equal portions, which they call Abzah, in the singular Hash, each subdivided into four equal parts; which is also an imitation of the Jews, who have an ancient division of their Mithras into sixty portions called Mafheulah. But the Koran is more usually divided into thirty sections only, named Azasa, from the singular azas, each of twice the length of the former, and in the like manner subdivided into four parts. These divisions are for the use of the readers of the Koran in the royal temples, or in the adjoining chapels where the secrets of God, his attributes, works, judgments, and ordinances, delivered in those verses; many of which have their particular titles also, imposed in the same manner as those of the chapters.

Next after the title, at the head of every chapter, except only the ninth, is prefixed the following solemn form, by the Mahometans called the Bismillah, In the name of the most merciful God: which form they constantly place at the beginning of all their books and writings in general, as a peculiar mark or distinguishing characteristic of their religion, it being counted a sort of impolicy to omit it. The Jews, for the same purpose, make use of the form, In the name of the Lord, or, In the name of the great God; and the eastern Christians that of, In the name of the Father, and of the Son, and of the Holy Ghost. But Mahomet probably took this form, as he did many other things, from the Persian Magi, who used to begin their books in these words, Beinam Teydan kalbshahfigher dader; that is, In the name of the most merciful just God.

There are twenty-nine chapters of the Koran, which have this peculiarity, that they begin with certain letters of the alphabet, none with a single one, others with more. These letters the Mahometans believe to be the peculiar marks of the Koran, and to conceal several profound mysteries; the certain understanding of which, the more intelligent confefs, has not been communicated to any mortal, their prophet only excepted. Notwithstanding which, some will take the liberty of gueffing at their meaning by that species of Cabala called by the Jews Notarikon, and suppose the letters to stand for as many words, expressing the names and attributes of God, his works, his judgments, and decrees; and therefore these mystical letters, as well as the verses themselves, seem in the Koran to be called signify. Others explain the intent of these letters from their nature or origin, or else from their value in numbers, according to another species of the Jewish Cabala called Gematria: the uncertainty of which conjectures sufficiently appears from their disagreement. Thus, for example, five chapters, one of which is the second, begin with these letters A. L. M. which some imagine to stand for Allah latiff magid, "God is gracious and to be glorified," or, Allah minah, i.e. to me and from me, viz. belongs all perfection, and proceeds all good; or else for Ana Allah alam, "I am the most wise God," taking the first letter to mark the beginning of the first word, the second the middle of the second word, and the third the last of the third word; or for Allah, Gabriel, Mohammed, the author, revealer, and preacher of the Koran. Others say, that as the letter A belongs to the lower part of the throat, the first of the organs of speech; L to the palate, the middle organ; and M to the lips, which are the last organ; so these letters signify that God is the beginning, middle, and end, or ought to be praised in the beginning, middle, and end, of all our words and actions; or, as the total value of these three letters, in numbers, is seventy-one, they signify, that, in the space of so many years, the religion preached in the Koran should be fully established. The conjecture of a learned Christian is at least as certain as any of the former, who supposes these letters were set there by the amanenis, for Amar bi Mohammed, i.e. at the command of Mohammed, as the five letters prefixed to the nineteenth chapter seem to be there written by a Jewish scribe, for Coh yaz, i.e. Thus be commanded.

The Koran is universally allowed to be written with the utmost elegance and purity of language, in the dialect of the tribe of Koreish, the most noble and polite of all the Arabsians, but with some mixture, tho' very rarely, of other dialects. It is confessedly the standard of the Arabic tongue, and, as the more orthodox believe, and are taught by the book itself, inimitable by any human pen (though some fectaries have been of another opinion), and therefore infifted on as a permanent miracle, greater than that of raising the dead, and alone sufficient to convince the world of its divine original.

And to this miracle did Mahomet himself chiefly appeal for the confirmation of his mission, publicly challenging the most eloquent men in Arabia, which was at that time flocked with thousands whose sole study and ambition it was to excel in elegance of style and composition, to produce even a single chapter that might be compared with it (a).
To the pomp and harmony of expression本期 note all the force and effect of the Alcoran; which they consider as a sort of music, equally fitted with other species of that art to ravish and amaze. In this Mahomet succeeded so well, and so strangely captivated the minds of his audience, that several of his opponents thought it the effect of witchcraft and enchantment, as he himself complains. Others have attributed the effect of the Alcoran to the frequent mention of rewards and punishments; heaven and hell occurring almost in every page. Some suppose, that the few fulfial pleasures of paradise, so frequently set before the imaginations of the readers of the Alcoran, were what chiefly bewitched them. Tho' with regard to these, there is a great dispute whether they are to be understood literally or spiritually. Several have even allegorized the whole book.

The general design of the corporation was to unite the professors of the three different religions, then followed in the populous country of Arabia (who for the most part lived promiscuously, and wandered without guides, the far greater number being idolators, and the rest Jews and Chrisrians mostly of erroneous and heterodox belief), in the knowledge and worship of one God, under the sanction of certain laws, and the outward signs of ceremonies partly of ancient and partly of novel institution, enforced by the consideration of rewards and punishments both temporal and eternal; and to bring them all to the obedience of Mahomet, as the prophet and ambassador of God, who, after the repeated admonitions, promises, and threats, of former ages, was at last to establish and propagate God's religion on earth, and to be acknowledged chief pontiff in spiritual matters, as well as supreme prince in temporal.

The great doctrine then of the Alcoran, is the unity of God; to restore which point Mahomet pretended was the chief end of his mission; it being laid down by him as a fundamental truth, That there never was, nor ever can be, more than one true orthodox religion. For, though the particular laws or ceremonies are only temporary, and subject to alteration, according to the divine direction; yet the subsistence of it being eternal truth, is not liable to change, but continues immutably the same. And he taught, that, whenever this religion became neglected, or corrupted in essentials, God had the goodness to re-inform and re-admonish mankind thereof, by several prophets, of whom Moys and Jesus were the most distinguishing, till the appearance of Mahomet, who is their seal, and no other to be expected after him. The more effectually to engage people to hearken to him, great part of the Alcoran is employed in relating examples of dreadful punishments formerly inflicted by God on those who rejected and abused his messengers; several of which stories, or some circumstances of them, are taken from the Old and New Testaments, but many more from the apocryphal books and traditions of the Jews and Christians of those ages, set up in the Alcoran as truth in opposition to the scriptures, which the Jews and Chrisrians are charged with having altered: and indeed, few or none of the relations or circumstances in the Alcoran were invented by Mahomet, as is generally suppos'd, it being easy to trace the greatest part of them much higher, as the rest might be, were more of those books extant, and was it worth while to make the inquiry.

The rest of the Alcoran is taken up in prescribing necessary laws and directions, frequent admonitions to moral and divine virtues, the worship and reverence of the Supreme Being, and resignation to his will. One of their most learned commentators distinguishes the contents of the Alcoran into allegorical and literal; under the former are comprehended all the obscure, parabolical, and enigmatical passages, with such as are repealed, or abrogated: the latter, such as are clear, and in full force.

The most excellent moral in the whole Alcoran, interpreters say, is that in the chapter Al Airaf, viz. Shew mercy, do good to all, and dispute not with the ignorant; or, as Mr. Sale renders it, Use indulgence, command that which is just, and withdraw far from the ignorant. Mahomet, according to the authors of the Kûshaf, having begged of the angel Gabriel a more ample explication of this passage, received in the following terms: "Seek him who turns thee out, give to him who takes from thee, pardon him who injures thee; for God will have you plant in your souls the "roots of his chief perfections." It is easy to see that this commentary is copied from the gospel. In reality, the necessity of forgiving enemies, though frequently inculcated in the Alcoran, is of a later date among the Mahometans than among the Chrisrians; among those latter, than among the heathens; and to be traced originally among the Jews. (See Exodus xxxiii. 4, 5.) But it matters not so much who had it first, as who observes it best. The Caliph Hassam, son of Hali, being at table, a slave unfortunately let fall a dish of meat recking hot, which scalded him severely. The slave fell on his knees, rehearsing these words of the Alcoran, "Paraide is for those who refrain their anger." I am not angry with thee, answered the caliph. "And for those who forgive offences against them," continues the slave. I forgive thee thine, replies the caliph. "But above all, for those who return good for evil," adds the slave. I fet thee at liberty, rejoined the caliph; and I give thee ten dinars.

There are also a great number of occasional passages in the Alcoran, relating only to particular emergencies. For this advantage Mahomet had in the piecemeal method of receiving his revelation, that whenever he happened to be perplexed and grieved with anything, he had a certain resource in some new mod of revelation. It was an admirable contrivance of his, to engage people to hearken to him, great part of the Alcoran is employed in relating examples of dreadful punishments formerly inflicted by God on those who rejected and abused his messengers; several of which stories, or some circumstances of them, are taken from the Old and New Testaments, but many more from the apocryphal books and traditions of the Jews and Christians of those ages, set up in the Alcoran as truth in opposition to the scriptures, which the Jews and Christians are charged with having altered: and indeed, few or none of the relations or circumstances in the Alcoran were invented by Mahomet, as is generally suppos'd, it being easy to trace the greatest part of them much higher, as the rest might be, were more of those books extant, and was it worth while to make the inquiry.

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of power, from whence Gabriel revealed it to Mahomet by parcels, some at Mecca, and some at Medina, at different times, during the space of 23 years, as the exigency of affairs required; giving him, however, the comission to show him the whole (which they tell us was bound in silk, and adorned with gold and precious stones of paradise) once a-year; but in the last year of his life he had the favour to see it twice. They say, that few chapters were delivered entire, the most part being revealed piecemeal, and written down from time to time by the prophet's amanuensis in such a part of each and such a chapter, till they were completed, according to the directions of the angel. The first parcel that was revealed is generally agreed to have been the first five verses of the 96th chapter.

After the new-revealed passages had been from the prophet's mouth taken down in writing by his scribe, they were published to his followers; several of whom took copies for their private use, but the far greater number got them by heart. The originals, when returned, were put promiscuously into a chest, observing no order of time; for which reason it is uncertain when many passages were revealed.

When Mahomet died, he left his revelations in the same disorder, and not digested into the method, such as it is, in which we now find them. This was the work of his successor Abu Beer; who, considering that a great number of passages were committed to the memory of Mahomet's followers, many of whom were slain in their wars, ordered the whole to be collected, not only from the palm-leaves and skins on which they had been written, and which were kept between two bits of leather, but also from the mouths of such as had gotten them by heart. And this transcript, when completed, he committed to the custody of Haffa the daughter of Omar, one of the prophet's widows.

From this relation it is generally imagined that Abu Beer was really the compiler of the Koran; though, for aught appears to the contrary, Mahomet left the chapters complete as we now have them, excepting such passages as his successor might add or correct from those who had gotten them by heart; what Abu Beer did, being perhaps no more than to range the chapters in the preëxisting order, which he seems to have done without any regard to time, having generally placed the longest first.

However, in the 50th year of the Hegira, Othman being then caliph, and observing the great disarrangement in the copies of the Koran in the several provinces of the empire; those of Irak, for example, following the reading of Abu Mafa al Affari, and the Syrians that of Madad Ebn Awaal: he, by the advice of the companions, ordered a great number of copies to be transcribed from that of Abu Beer; in Haffa's care, under the inspection of Zaid Ebn Thabet, Abd Allah Ebn Zobair, Said Ebn al As, and Ad'dalrahman Ebn al Hareth the Maklmunites; whom he directed, that, wherever they differed about any word, they should write it in the dialect of the Koreth, in which it was at first delivered. These copies, when made, were differed in the several provinces of the empire, and the old ones burnt and suppressed. Though many things in Haffa's copy were corrected by the above-mentioned revisers, yet some few various readings still occur.

In fact, the book of the Alcoran is held in the highest esteem and reverence among the Musselmans. They dare not to touch the Alcoran without being first washed, or legally purified; to prevent which, an inscription is put on the cover or label, Let none touch but they who are clean. It is read with great care and respect; being never held below the girdle. They swear by it; take omons from it on all weighty occasions; carry it with them to war; write sentences of it in their banners; adorn it with gold and precious stones; and knowingly suffer it not to be in the possession of any of a different religion. Some say that it is punishable even with death, in a Christian, to touch it; others, that the veneration of the Musselmans leads them to condemn the translating it into any other language as a profanation: but these seem to be aggravations. The Mahometans have taken care to have their scripture translated into the Persian, the Java, the Malay, and other languages; tho' out of respect to the original, these versions are generally, if not always, interlineated.

By the advocates of Mahometanism, the Koran, as already observed, has always been held forth as the greatest of miracles, and equally stupendous with the act of raising the dead. The miracles of Moses and Jesus, they say were transient and temporary; but that of the Koran is permanent and perpetual; and therefore far surpasses all the miraculous events of preceding ages. We will not detract from the real merit of the Koran: we allow it to be generally elegant, and often sublime; but at the same time we reject with disdain its arrogant pretense to any thing supernatural; all the real excellence of the work being easily referable to natural and visible causes.

In the language of Arabia, a language extremely loved and diligently cultivated by the people to whom it was vernacular, Mahomet found advantages which were never enjoyed by any former or succeeding impostor. It requires not the eye of a philosopher to discover in every foal and country a principle of national pride; and if we look back for many ages to the history of the Arabians, we shall easily perceive that pride among them invariably to have confounded in the knowledge and improvement of their native language. The Arabic, which has so justly effemed the most copious of the eastern tongues; which has effumed from the remotest antiquity; which has been established by numberless poets, and refined by the constant exercise of the natives; was the most successful instrument which Mahomet employed in planting his new religion among them. Admirably adapted by its unrivalled harmony, and by its endless variety to add painting to expression, and to perfume the imagination in its unbounded flight; it became in the hands of Mahomet an irresistible charm to blind the judgment, and to captivate the fancy of his followers.

"Of that description of men who first composed the adherents of Mahomet, and to whom the Koran was addressed, few, probably, were able to pass a very accurate judgment on the propriety of the sentiments, or on the beauties of the diction: but all could judge of the military abilities of their leader; and in the midst of their admiration it is not difficult to conceive, that they would ascribe to his compositions every imaginary beauty of inspired language.

"The shepherd and the folder, though awake to the
The prophet of Arabia had in this respect advantages peculiar to himself. His compositions were not to his followers the works of man, but the genuine productions of genius, and thus became the divine original, that which Mahomet delivered from the inspired lectures of that Being whom he revered as the object of his own imagination the stream which flowed through his polterity.

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"In the first periods of the literature of every country, something of this kind has happened. The father of Grecian poetry very obviously influenced the taste and imitation of his countrymen. The modern nations of Europe all possess some original author, who, rising from the darkened mists of ages, has begun the career of composition, and tinctured with the character of his own imagination the stream which flowed through his polterity.

"When therefore we consider these peculiar advantages of the Koran, we have no reason to be surprised at the admiration in which it is held. But if, descending to a more minute investigation of it, we consider its perpetual insufficiency and absurdity, we shall indeed have cause for astonishment at that weakness of humanity which could ever have received such compositions as the work of the Deity.

"The first praise of all the productions of genius, is invention; that quality of the mind, which, by the extent and quickness of its views, is capable of the largest conceptions, and of forming new combinations of objects the most distant and unusual. But the Koran bears little impress of this transcendent character. Its materials are wholly borrowed from the Jewish and Christian scriptures, from the Talmudical legends and apocryphal gospels then current in the East, and from the traditions and fables which abounded in Arabia. The materials collected from these several sources are here heaped together, with perpetual and needless repetitions, without any settled principle or visible connection.

"When a great part of the life of Mahomet had been spent in preparatory meditation on the system he was about to establish, its chapters were dealt out slowly and separately during the long period of 23 years. Yet thus defective in its structure, and not less exceptionable in its doctrines, was the work which Mahomet delivered to his followers as the oracles of God.

"The most prominent feature of the Koran, that point of excellence in which the partiality of its admirers has ever delighted to view it, is the sublime notion of the nature and attributes of God. Its author had really derived these just conceptions from the inspiration of that Being whom they attempt to describe, they would not have been surrounded, as they now are on every side, with error and absurdity. But it might easily be proved, that whatever it justly defines of the divine attributes, was borrowed from our holy scripture; which even from its first promulgation, but especially from the completion of the New Testament, has extended the views and enlightened the understandings of mankind; and thus furnished them with arms, which have too often been ineffectually turned against itself by its ungenerous enemies.

"In this instance particularly, the copy is far below the great original, both in the propriety of its images, and the force of its descriptions. Our holy scriptures are the only compositions that can enable the dim sight of mortality to penetrate into the invisible world, and to behold a glimpse of the Divine perfections. Accordingly, when they would represent to us the happiness of Heaven, they describe it, not by any thing minute and particular, but by something general and great; something, that without depending to any determinate object, may at once by its beauty and immensity excite our wishes and elevate our affections. Though in the prophetic and evangelical writings the joys that shall attend us in a future state are often mentioned with a genteel admiration, they are expressed rather by allusion than similitude, rather by indefinite and figurative terms, than by any thing fixed and determinate.

"Eye hath not seen, nor ear heard, neither have entered into the heart of man, the things which God hath prepared for them that love him." 1 Cor. ii. 9.

What a reverence and astonishment does this passage excite in every hearer of taste and piety! What energy, and at the same time what simplicity, in the expression? How sublime, and at the same time how obscure, is the imagery.

"Different was the conduct of Mahomet in his descriptions of heaven and of paradise. Unaffected by the necessary influence of virtuous intentions and Divine inspiration, he was neither droll nor indeed able to exhibit the minds of men to sublime conceptions, or to rational expectations. By attempting to explain what is inconceivable, to describe what is ineffable, and to materialize what in itself is spiritual; he absurdly and improvidently aimed to feminize the purity of the Divine essence. Thus he fabricated a system of incoherence, a religion of depravity, totally repugnant indeed to the
The Persians are generally Alcoranists, as admitting the Alcoran alone for their rule of faith. The Turks, Tartars, Arabs, &c. besides the Alcoran, admit a multitude of traditions. The Alcoranists, among Mahometans, amount to much the same with the Textuates among the Jews. The Alcoranists can find nothing excellent out of the Alcoran; are enemies of philosophers, metaphysicians, and scholastic writers. With them the Alcoran is everything.

ALCOVE, among builders, a recess, or part of a chamber separated by an eltrade, or partition of columns, and other corresponding ornaments, in which is placed a bed of state, and sometimes seats to entertain company. These alcoves are frequent in Spain; and the bed is raised two or three ascents, with a rail at the foot.

ALCUINUS (Placentius), an ecclesiastic of the eighth century. Where he was born, is a matter of dispute; but, according to the most probable opinion, it was in Yorkshire. It is pretty certain, however, that he was educated at York, under the direction of archbishop Egbert, as we learn from his own letters, in which he frequently calls that greatprelate his beloved master, and the clergy of York the companions of his youthful studies. As he survived venerable bede about 70 years, it is hardly possible that he could have received any part of his education under him, as some writers of literary history have affirmed; and it is worthy of observation, that he never calls that great man his master, though he speaks of him with the highest veneration. It is not well known to what prerogatives he had attained in the church before he left England, though some say he was abbot of Canterbury. The occasion of his leaving his native country, was his being sent on an embassy by Offa king of Mercia to the emperor Charlemagne; who contracted so great an esteem and friendship for him, that he earnestly solicited, and at length prevailed upon him, to settle in his court, and became his preceptor in the sciences. Alcuinus accordingly instructed that great prince in rhetoric, logic, mathematics, and divinity; which rendered him one of his greatest favourites. "He was treated with so much kindness and familiarity (says a contemporary writer) by the Emperor, that the other courtiers called him, by way of eminence, the emperor's delight." Charlemagne employed his learned favourite to write several books against the heretical opinions of Felix Bishop of Urgel in Catalonia, and to defend the orthodox faith against the heresies, in the council of Franport, A.D. 804; which he performed to the entire satisfaction of the Emperor and council, and even to the conviction of Felix and his followers, who abandoned their errors. The Emperor consulted chiefly with Alcuinus on all things relating to religion and learning; and, by his advice, did many great things for the advancement of both. An academy was established in the imperial palace, over which Alcuinus presided, and in which the princes and prime nobility were educated; and other academies were established in the chief towns of Italy and France, at his instigation, and under his inspection. "France (says, one of our best writers of literary history) is indebted to Alcuinus for all the polite learning it boasted of in that and the following ages. The universities of Paris, Tours, Fulda, Soissons, and many others,
And truly, in his task of embellishment, some things are found in particular here and there, which seem not to favour of Alcyonius, but of some higher author.

The two orations he made after the taking of Rome, wherein he represented very strongly the injustice of Charles V. and the barbarity of his soldiers, were excellent pieces. There is also an oration ascribed to him on the knights who died at the siege of Rhodes.

ALDBOROUGH, a sea-port town in Suffolk, with a market on Saturdays. It is pleasantly situated, in a dale, between a high hill to the westward, on which its large old-built church stands; the sea to the east, and its river running south-west. It is a large, long, ordinary town, made up of two or three streets of low houses, running parallel to each other. A quarter of a mile to the south lies Slaughden, where they have a commodious key, with warehouses for ships; more fowtherly still, they have conveniences for drying their north-sea fish. Their employment in the fisheries is their chief business, which is considerable in the seafsons for catching herrings and sprats; and it is the only place in England for curing red sprats. It is a town corporate, and lends two members to parliament. Towards the sea, it has some pieces of cannon planted for its defence. It is 88 miles north-east from London. E. Long. 1. 32. N. Lat. 52. 50.

ALDBOROUGH, a market-town in the west riding of Yorkshire, seated on the river Ouse, 15 miles north-west of York, and 200 miles north of London. It lends two members to parliament. W. Long. o. 20. N. Lat. 54. 15. It was anciently a Roman city, called Isurium Brigantium; and several coins and monuments of the Saxons and Romans have been discovered here.

ALDEBARAN, in astronomy, a star of the first magnitude, called in English the bull's eye, as making the eye of the constellation Taurus. Its longitude is 6 deg. 32 min. 9 sec. of Gemini, and its latitude 5 deg. 29 min. 40 sec. north.

ALDER-tree, in Botany. See Betula.

ALDERHOLM, a pleasant island of Sweden, formed by the three arms of a river running thro' Gentle, a town of Norland, in Sweden. Here is a wharf, a repository for planks and deals, two packing houses, a large cutchouse for taking toll of the ships, an arsenal for cannon, and a granary.

ALDERMAN, in the British policy, a magistrate subordinate to the lord-mayor of a city or town-corporate. The number of these magistrates is not limited, but is more or less according to the magnitude of the place. In London they are 26; each having one of the wards of the city committed to his care. This office is for life; so that when one of them dies, or resigns, a ward-mote is called, who return two persons, one of whom the lord-mayor and aldermen choose to supply the vacancy. All the aldermen are justices of the peace, by a charter of 15 Geo. II. The aldermen of London, &c. are exempted from serving inferior offices; nor shall they be put upon salaries, or serve on juries, so long as they continue to be aldermen.

Alderman, among the ancient Saxons, was a degree of nobility answering to earl or count at present. Alderman was also used, in the time of king Edgar, for a judge or justice. Thus we meet with the
ALDERNEY, an island in the British Channel, subject to the crown of Great Britain. It is about eight miles in compass, and is separated from Cape la Hogue, in Normandy, by a narrow strait, called the Race of Alderney, which is a very dangerous passage in stormy weather when the two currents meet; otherwise it is safe, and has depth of water for the largest ships. Thro' this strait the French fleet made their escape after their defeat at La Hogue, in 1692. It is a healthy island, but has one church, is fruitful both in corn and pattle, and is remarkable for a fine breed of cows. The inhabitants, for their greater safety, live together in a town of the same name. The number of houses are said to be 200, and the inhabitants 1000. It has but one harbour, called Crably, which is at a good distance from the town; and is only fit for small vessels. To the west lie the range of rocks called the Gaffets, so dangerous to mariners. W. Long, p. 17. N. Lat. 49. 50.

ALDEHELM (St.), bishop of Sherburn in the time of the Saxon Heptarchy. He is said to have been the son of Kenred, brother to Ina, king of the West-Saxons; but, in the opinion of William of Malmbury, his father was no more than a distant relation to the king. Having received the first part of his education in the school which one Macduff, a learned Scot, had set up in the place where Malmbury now stands, he travelled into France and Italy for his improvement. At his return home, he studied some time under Adrian abbot of St. Augustine's in Canterbury, the most learned professor of the sciences who had ever been in England. In these different seminaries he acquired a very uncommon stock of knowledge; and became famous for his learning, not only in England, but in foreign countries: whence several learned men fent him their writings for his perusal and correction; particularly Prince Arcivill, a son of the King of Scotland, who wrote many pieces which he sent to Aldhelm, "in treating him to give them the last polish, by rubbing off their Scots raft." He was the first Englishman who wrote in the Latin language both in prose and verse, and composed a book for the instruction of his countrymen in the profody of that language. Besides this, he wrote several other treatises on various subjects; some of which are lost, and others published by Martin Delrio and Canisius. Venerable Bede, who flourished in the end of this and the beginning of the next century, gives the following character of Aldhelm: "He was a man of universal learning, having an elegant style, and being wonderfully well qualified in both philosophical and religious subjects." In fact, considering the cloud of ignorance by which he was surrounded, and the great difficulty of acquiring knowledge without proper instruction, Aldhelm was a very extraordinary man. From one of his letters to Icedda bishop of Winchester, concerning the nature of his studies whilst at Canterbury, he appears to have been indefatigably determined to acquire every species of learning in his power. For a copy of this curious epistle, see Henry's History, vol. ii. p. 320. King Alfred the Great declared, that Aldhelm was the best of all the Saxon poets; and that a favourite song, which was universally sung in his time, near 200 years after its author's death, was of his composition. When he was abbot of Malmbury, having a fine voice, and great skill in music as well as poetry, and observing the backwardness of his barbarous countrymen to listen to grave instructions, he composed a number of little poems, which he sung to them after masses in the sweetest manner; by which they were gradually instructed and civilized. After this excellent person had governed the monastery of Malmbury, of which he was the founder, about 30 years, he was made bishop of Sherburn, where he died A. D. 709. He wrote, 1. De oth vita pricipatibus. This treatise is extant in Bibliotheca Patrum of Canisius. 2. Epistola de vita et illustrativa. 3. De vita monachorum. 4. De laude sanctarum. 5. De piacio canonicum. 6. De aquae. 7. De astrologia. 8. A book against the mistake of the Britons concerning the celebration of Easter; printed by Soulis, 1576. 9. De laude virginitatis. Manuscript, in Bennet-college, Cambridge. Published among Bede's Opera. Besides many sonnets, epistles, and homilies in the Saxon language.

ALDPORT, an ancient name for Manchester.

See Manchester.

ALDRED, abbot of Tavistock, was promoted to the bishopric of Worcester in the year 1046. He was so much in favour with King Edward the Confessor, and had so much power over his mind, that he ordered him to be reconciled with the worst of his enemies, particularly with Swane son of the earl Goodwin, who had revolted against him, and came with an army to invade the kingdom. Aldred restored the union and friendship between king Edward and Griffin king of Wales. He took afterwards a journey to Rome, and being returned into England, in the year 1054, he was sent embassador to the emperor Henry II.; he laid a whole year in Germany, and was very honourably entertained by Herman archbishop of Cologne, from whom he learned many things relating to ecclesiastical discipline, which on his return he established in his own diocese. In the year 1058 he went to Jerusalem, where, no archbishop or bishop of England had ever done before him. Two years after he returned to England; and Kinian archbishop of York dying the 22d of December 1060, Aldred was elected in his stead on Christmas day following, and thought fit to keep his bishopric of Worcester with the archbishopric of Canterbury, as some of his predecevers had done. Aldred went soon after to Rome, in order to receive the pallium from the Pope: He was attended by Tofton earl of Northumberland, Gifo bishop of Wells, and Walter bishop of Hereford. The pope received To-
the prelate, unmoved at all this, answered calmly, "Good men, let him lie there, for he is not at Aldred's but at St Peter's feet; he must feel St Peter's power, since he dared to injure his vicegerent." Having thus reproved the nobles by his episcopal authority, he vouched to take the king by the hand, and to tell him the ground of his complaint. The king humbly excused himself, by saying he had been ignorant of the whole matter; and begged of the noblemen to intreat the prelate, that he might take off the curse he had pronounced Canute's, and change it into a blessing. Aldred was at last prevailed upon to favour the king thus far; but not without the promise of several presents and favours, and only after the king had granted him to take such a revenge on the governor as he thought fit. Since that time (adds the historian) none of the noblemen ever dared to offer the least injury. It may be questioned, which was more surprising here, whether the archbishop's haughtiness, who dared to treat his sovereign after so unbecoming a manner; or the king's stupidity, who suffered such insolence and audacity from a priest?—The Danes having made an invasion in the north of England in the year 1068, under the conduét of Harold and Canute the sons of king Swan, Aldred was so much afflicted at it, that he died of grief the 11th of September in that same year, having besought God that he might not see the desolation of his church and country.

ALDRICH (Robert), bishop of Carlile, was born at Burnham in Buckinghamshire about the year 1493, and educated at Eaton-school; from whence, in 1507, he was elected scholar of King's College, Cambridge, where he took his degree in arts, and was afterwards professor of the univercity at St Peter, and to him the faint's vicar, for the injury he had done them; adding, that if he refused to comply, the archbishop would make use of his apostolic authority against him, (intimating thereby that he would excommunicate him). The governor, offended at this proud message, used the persons whom the archbishop had sent him very ill, and returned an answer as haughtily as the message was. Aldred thereupon went to London to make his complaint to the king; but in this very complaint he acted with his wonted insolence; for meeting the king in the church of St Peter at Westminster, he spoke to him in these words: "Hearken, O William: when thou wast but a foreigner, and God, to punish the sins of this nation, permitted thee to become master of it, after having died a great deal of blood, I consecrated thee, and put the crown upon thy head with blessings; but now, because thou hast deferved it, I pronounce a curse over thee, instead of a blessing, since thou art become the perverter of God's church, and of his ministers, and hast broken the promises and oaths which thou

"madest to me before St Peter's altar." The king, terrified at this discourse, fell upon his knees, and humbly begged the prelate to tell him, by what crime he had deferved so severe a sentence. The noblemen, who were present, were enraged against the archbishop, and loudly cried out he deserved death, or at least bastinado, for having offered such an injury to his sovereign, and they pressed him with threatenings to raise the king from the ground. But the prelate, unmoved at all this, answered calmly, "Good men, let him lie there, for he is not at Aldred's but at St Peter's feet; he must feel St Peter's power, since he dared to injure his vicegerent." Having thus reproved the nobles by his episcopal authority, he vouched to take the king by the hand, and to tell him the ground of his complaint. The king humbly excused himself, by saying he had been ignorant of the whole matter; and begged of the noblemen to intreat the prelate, that he might take off the curse he had pronounced Canute's, and change it into a blessing. Aldred was at last prevailed upon to favour the king thus far; but not without the promise of several presents and favours, and only after the king had granted him to take such a revenge on the governor as he thought fit. Since that time (adds the historian) none of the noblemen ever dared to offer the least injury. It may be questioned, which was more surprising here, whether the archbishop's haughtiness, who dared to treat his sovereign after so unbecoming a manner; or the king's stupidity, who suffered such insolence and audacity from a priest?—The Danes having made an invasion in the north of England in the year 1068, under the conduét of Harold and Canute the sons of king Swan, Aldred was so much afflicted at it, that he died of grief the 11th of September in that same year, having besought God that he might not see the desolation of his church and country.

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Aldrich was a most universal scholar, and had a taste for all sorts of learning, especially architecture. Sir John Hawkins has favoured the public with several particulars relative to Dr Aldrich's skill in music; and on account of the Doctor's eminence in this respect, Sir John hath given his life, with his head prefixed. His abilities as a musician rank him, we are told, among the greatest masters of the science. He composed many services for the church, which are well known; and are also his anthems, nearly to the number of twenty. He adapted, with great skill and judgment, English words to many of the notes of Palestrina, Carissimi, Victoria, and other Italian composers for the church, some of which are frequently sung in the cathedrals as anthems.

By the happy talent which Dr Aldrich possest, of naturalizing the compositions of the old Italian masters, and accommodating them to an English ear, he increased the stores of his own college. Though the Doctor chiefly applied himself to the cultivation of sacred music, yet, being a man of humour, he could divert himself by producing pieces of a lighter kind. There are two catches of his; the one, "Hark the bonny Christ-church Bells," the other intituled, "A Smoking Catch," to be sung by four men smoking their pipes, which is not more difficult to sing than deviating to hear. His love of smoking was, it seems, so excessive as to be an entertaining topic of discourse in the university. Such was Dr Aldrich's regard for the advancement of music, and the honour of its professors, that he had formed a design of writing a history of the science; and the materials from which he proposed to compile it are yet extant in the library of his own college. It appears from these materials, that he had marked down every thing which he had met with concerning music and musicians; but that he had wrought no part of them into any kind of form.

Dr Aldrich is of some note as a Latin poet. In the Sylva Anglica, we find two elegant copies of verses by him; one on the accession of King William III. and the other on the death of the Duke of Gloucester. Sir John Hawkins hath preserved a humorous translation by him of the well-known English ballad,

"A soldier and a sailor," 
"A tink'er and a taylor," &c.

The following epigram, intitled "Canfa Bibendi," is likewise ascribed to Dr Aldrich:

"Si bene quid memini, Caufae fiant quinque bibendi, 
Hofpitis Adventus; praefent Sitis, arisque futura; 
Ant Vini Bonitas; que libet altera Canfa."

The epigram has been thus translated:

"If on my theme I rightly think, 
"There are five reasons why men drink; 
"Good wine, a friend, because I'm dry, 
"Or left I should be by and by, 
"Or any other reason why."

The translation is not equal to the original. It is evident, from the verses cited and referred to, that Dr Aldrich was a most skilful and pleasant turn of mind. Indeed, he is always spoken of as having been a man of wit; and as one who, to his great talents and virtues, joined those amiable qualities, which rendered him the object of general affection, as well as of general esteem and respect. Having never been married, he appropriated his income to works of hospitality and benificence, and in encouraging learning to the utmost of his power, of which he was a most munificent patron, as well as one of the greatest men in England, if considered as a christian or a gentleman. He had always the interest of his college at heart, whereby he was an excellent governor. And, as he was remarkable for modesty and humility, concealing his name to those several learned tracts he published, to his death he appointed to be buried without any memorial in the cathedral; which his thrifty nephew compiled with, depositing him on the south side of bishop Fell's grave, December 22, eight days after his decease; which happened in the 63d or 64th year of his age.

ALDROVANDUS (Ulysses), professor of philosophy and physic at Bologna, the place of his nativity. He was a most curious inquirer into natural history, and travelled into the most distant countries on purpose to form himself of their natural productions. Minerals, metals, plants, and animals, were the objects of his curious researches; but he applied himself chiefly to birds, and was at great expense to have figures of them drawn from the life. Aubert le Mire says, that he gave a certain painter, famous in that art, a yearly salary of 200 crowns, for 30 years and upwards; and that he employed at his own expense Lorenzo Bennini and Cornelius Swintus, as well as the famous engraver Christoper Coriolanus. These expenses ruined his fortune, and at length reduced him to the utmost necessity; and it is said that he died blind in an hospital at Bologna, at a great age, in 1665. Mr Bayle observes, that antiquity does not furnish us with an instance of a design so extensive and so laborious as that of Aldrovandus, with regard to natural history; that Pliny has treated of more kinds of subjects, but only touches lightly on them, saying but a little upon any thing, whereas Aldrovandus has collected all he could meet with. His compilation, or that compiled upon

3B his
his plan, consists of 13 volumes in folio, several of which
were printed after his death. He himself published
his Ornithology, or History of Birds, in three folio vol-
umes, in 1599; and his seven books Of Insects, which
make another volume of the same size. The volume
Of Serpents, three Of Quadrupeds, one Of Fishes,
that Of Exanguous Animals, the History of Monitors,
with the Supplement to that of Animals, the treatise
Of Metals, and the Dendrology or History of Trees,
were published at several times after the death of Al-
drovandas, by the care of several persons; and Aldro-
vandas is the sole author only of the first six volumes
of this work, the rest having been finished and compiled
by others, upon the plan of Aldrovandas: a most ex-
tensive plan, wherein he not only relates what he has
read in naturalists, but remarks also what historians
have written, legislators ordained, and poets regnied:
he explains also the different uses which may be made
of the things he treats of, in common life, in medicine,
architecture, and other arts; in short, he speaks of
morality, proverbs, devices, riddles, hieroglyphics,
and many other things which relate to his subject.

ALDROVANDA, in botany, a genus of the pen-
taerose order, belonging to the pentagonia class of
plants, of which there is but one species. The calyx
is divided into five parts; the petals are five; and the
capsule has five valves, with ten seeds. It is a native
of Italy and the Indies; and has no English name.

ALDUABIS (anc. geog.), a river of Celtic Gaul,
which rising from Mount Jura, separating the Sequani
from the Helveti, and running through the county of
Burgundy, or the Franche Comté, environs almost on
every side the city of Besançon; and running by Dole,
falls into the Saone near Chalone. In Caesar it is called
Madaugibus; in Ptolemy, Dobas; now le Droix.

A LE, a fermented-liquid obtained from an infusion
of malt, and differing from beer chiefly in having a less
proportion of hops. (See Brewing.) This liquor,
the natural substitute of wine in such countries as could
not produce the grape, was originally made in Egypt,
the first planted kingdom, on the diiference from the
east, that was suppos'disable to produce grapes. And,
as the Noachian colonies pierced further into the west,
they found, or thought they found, the same defect,
and filled it in the same manner. Thus the natives
of Spain, the inhabitants of France, and the aborigines
of Britain, all used an infusion of barley for their ordi-
ary liquor: and it was called by the various names of
Caeia and Crevis in the first country, Cerevisia in the
second, and Curtai in the last; all literally importing
only the strong water.

All the several nations (says Pliny) who inhabit
the west of Europe, have a liquor with which they in-
toxicate themselves, made of corn and water. The
manner of making this liquor is somewhat different in
Gaul, Spain, and other countries, and is called by
many various names; but its nature and properties are
everywhere the same. The people of Spain, in particu-
lar, brew this liquor so well, that it will keep good
a long time. So exquisite is the cunning of mankind,
in gratifying their vicious appetites, that they have
thus invented a method to make water itself intoxica-
care. The method in which the ancient Britons, and
other Celtic nations, made their ale, is thus described
by Luidoros and Orofius. "The grain is steeped in
water and made to germinate, by which its spirits are
excited and set at liberty; it is then dried and grind-
ed: after which it is infused in a certain quantity of
water; which being fermented, becomes a pleasing,
warmed, strengthening, and intoxicating liquor."

This ale was most commonly made of barley; but some-
times of wheat, oats, and millet.

Anciently the Welsh and Scots had also two kinds
of ale, called common ale and spiced ale; and their va-lue was thus ascertained by law: "If a farmer hath
no mead, he shall pay two casks of spiced ale, or four
casks of common ale, for one cask of mead."

By this law, a cask of spiced ale, nine palms in height,
and 18 palms in diameter, was valued at a sum of mo-
ney equal in efficacy to L. 7. 10s. of our present mo-
cy; and a cask of common ale, of the same dimen-
sions, at a sum equal to L. 3. 15s. This is a sufficient
proof, that even common ale in this period was an ar-
ticle of luxury among the Welch, which could only
be obtained by the great and opulent. Wine seems
to have been quite unknown even to the kings of Wales
in this period, as it is not so much as once mentioned
in their laws; though Giraldus Cambrensis, who flour-
ished about a century after the conquest, acquaints us,
that there was a vineyard in his time at Macnamer,
pembroke, in South Wales.

Ale was the favourite liquor of the Anglo-Saxons
and Danes, as it had been of their ancestors the an-
cient Germans. Before their conversion to Chrisli-
ty, they believed that drinking large and frequent
draughts of ale was one of the chief felicitics which
those heroes enjoyed who were admitted into the hall
of Odin.

There are various sorts of ale known in Britain,
particularly pale and brown: the former is brewed from
malt slightly dried; and is esteemed more virfid than
the latter, which is made from malt more highly dried
or roasted. Pale ale brewed with hard waters, as those
of springs and wells, is judged the most wholesome, in regard the
mineral particles tend to prevent the cohesion of those
drawn from the grain, and enable them to pass the pro-
per receptacles the better; softer waters, as those of ri-
vers, and rain, seem better suited to draw out the sub-
fiance of high-dried malts which retain many igneous
particles, be absorbed in a smooth vehicle.

In Staffordshire, they have a secret of fining ale in
a very short time. Plot conjectures it to be done by
adding alum, or vinegar, in the working.

Ale is prepared various ways, and of various ingre-
dients, as of wheat, rye, millet, oats, barley, the ber-
ries of the quick-bean, &c.

Some have found that the juice which bleeds from
the birch or fycamore is of great use on this occasion,
applied instead of water. It makes one bushel of malt
go as far as four in the common way.

Some have a method of preparing ale, so that it will
keep, carried to the East or West Indies. The secret
is, by mashing twice with fresh malt; boiling twice;
and, after straining it, putting to every five gallons two
new-laid eggs, whole, to remain therein. It is said,
that, in a fortnight's time, the shells will be dissolv-
ed; and the eggs become like wind-eggs; and that after-
wards the white will disappear and the yolk remain
untothed.

Ale
ALE is generally held to be more diuretic than beer, in regard it is smoother, more soothing and relaxing; so that when urine is to be promoted by facilitating the passage, ale is most likely to effect it.

Ale is flatulent; and hence sometimes produces colicky, and the cholera morbus; it is accecent; but it does not produce calcareous discharges, as has been asserted. If muli-liquor, of any degree of strength, is become flat and tarryish, as it is used, it should be drawn out of the cask into a jug, in which as many drams of powdered chalk is put as there are to be pints of liquor; thus a new ferment will be raised, a spirtuoue taste will be restored to the liquor, and its acidity will be destroyed. Tart liquors of this kind are apt to produce dysentery, frangury, or a gonorhoea; in which cases, a small quantity of branzy may be taken.

The consumption of ale in Great Britain is incredible. It was computed twenty years ago at the value of four millions yearly, including Great Britain and Ireland.

The duties on ale and beer make a principal branch of the revenue in Britain. They were imposed by the 12th of Car. II. and have been continued by several subsequent acts of parliament to first Geo. III. which lays an additional duty of 3d. per barrel. In the whole, the brewer of ale and beer for sale shall pay 8s. for every barrel of either, above 6s. a barrel; and for every barrel of 6s. or under, the sum of 1s. 4d.

Medicated Ales, those wherein medicinal herbs have been infused, or added during the fermentation. See Pharmacy, (Index.)

Gill-Ale, is that in which the dried leaves of gill or ground-ivy have been infused. It is esteemed absetive and vulnerary, and consequently good in disorders of the breast and obstructions of the viscer.

Ale-Connor, an officer in London, who inspects the measures used in public houses. There are four ale-conners, who are all chosen by liverymen in a common hall on midsummer-day.

Ale-Houses must be licensed by justices of the peace, who take recognizances of the persons licensed, and of their sureties, viz. 19d. each, that they will not suffer unlawful gaming, nor other disorderly practices in their houses. Every person, excepting those who fell ale in fairs, neglecting to procure a license, is liable to a penalty of 40s. for the first offence, 4l. for the second, and 6l. for the third, with all costs. The licence is granted on the first of September, or within twenty days after, at a general meeting of the justices for the division to which he belongs, upon his producing a certificate to his character, unless by living in a city or town-corporate, this last circumstance is dispensed with, and continues in force for one year only. Ale-house keepers, selling ale in short measure, are liable to a penalty not exceeding 40s. and not less than 10s. and likewise to a fine of 10s. for permitting tipping, &c.

By 29th Geo. II. c. 12. persons keeping ale-houses in Scotland shall be licensed as in England, and the justices there shall meet annually to license ale-houses; on each of which license a fee of 1s. is payable to the clerk of the peace. Magistrates of royal boroughs shall be yearly for the like purpose; but where there shall not be a sufficient number of magistrates to act in any royal borough, justices may grant licenses, to be in force for one year only. Ibid.

Persons in Scotland convicted of keeping unlicensed ale-houses shall forfeit for the first offence 5s. for the second 10s. for the third 20s. and to be disqualified; and for every subsequent offence 40s. to be levied by diftreys and sale, on oath to the informer, the other to the poor of the parish. Conviction to be intimated to the offender, and certified to the clerk of the peace, and recorded: but persons aggrieved may appeal to the quarter sessions. Ibid.

Licences for houses on the military roads in Scotland shall be issued on payment of 1s. only to the clerk of the peace; making out licences before the fame be sealed, is a penalty of 10l. and making them contrary to the intention of this act, 5l. and the same shall be vacated, unless the duty and fine be paid, and the receipt produced, and licence stamped. Ibid.

ALE-Silver, a tax paid annually to the lord-mayor of London, by all who fell ale within the city.

ALEA, in Roman antiquity, denotes in general all manner of games of chance; but in a more restricted sense, was used for a particular game played with dice and tables, not unlike our backgammon.

ALEANDER (Jerome), cardinal and archbishop of Brindisi, was born in 1480, and distinguis hed himself at the beginning of the reformation, by the opposition he made to Luther, for being sent into Germany as the pope's nuncio in 1539, he acted, as occasion served, in the character of both ambassador and doctor; and declared three hours together against Luther's doctrine before the diet of Worms, but could not prevent that celebrated reformer from being heard in that diet.

He published several works, and died at Rome in 1542.

ALEANDER (Jerome), a learned man of the fourteenth century, born in the principality of Friuli, of the same family with the preceding. When he went to Rome, he was employed as secretary under cardinal O Caesar Bandini, and discharged this office with great honour for almost twenty years. He afterwards, by the persuasion of Urban VIII. who had a great esteem for him, became secretary to Cardinal Barberini, whom he accompanied to Rome where he was, in the character of legate a latere, and in whose service he died in 1631. He was one of the first members of the academy of Humorists, wrote a learned treatise in Italian on the device of the society, and displayed his genius on many different subjects. Barberini gave him a magnificent funeral at the academy of Humorists; the academists carried his corps to the grave, and Gaspere Simeonibus, one of the members, made his funeral oration.

ALECTORO, one of the Furies, daughter of Acheron and Night, and as others would have it, of Pluto and Proserpine.

ALECTORIA, a stone said to be formed in the gall bladders of old cocks, to which the ancients ascribed many fabulous virtues. This is otherwise called Alectoria Lapis, sometimes Alectoroitha, in English the cock-stone. The more modern naturalists hold the ai-heros lapis to be originally swallowed down, not generated in, the stomach or gizzard of cocks and capons. It is known that many of the fowl-kind make a practice of swallowing pebbles, as it is supposed to be of service in the business of trituration and digestion.

ALECTOROMANTIA, in antiquity, a species of divination performed by means of a cock. This is otherwise...
otherwise called Aletheumany; of which there appear
to have been different species. But that most spoken
of by authors was in the following manner: A circle
being described on the ground, and divided into twen-
ty-four equal portions, in each of these spaces
was written one of the letters of the alphabet, and on each
of the letters was laid a grain of wheat; after which,
a cock being turned loose in the circle, particular no-
tice was taken of the grains picked up by the cock,
because the letters under them, being formed into a
word, made the answer desired. It was thus, accor-
ding to Zonaras, that Libanias and Jamblichs sought
who should succeed the emperor Valens; and the cock
eating the grains answering to the space AEGA, se-
veral whose names began with those letters, as The-
odosius, Theodolitis, Theodulphus, &c. were put to death,
which did not hinder, but promote, Theodolus to the
succession. But the story, however current, is but ill
supported: It has been called in question by some,
and refuted by others, from the silence of Marcellinus
Socrates, and other historians of that time.

A-LEE, in the sea-language, a term only used when
the wind, croffing or flanking the line of a ship's
course, presses upon the masts and sails so as to make
her incline to one side, which is called the lee-side: hence,
when the helm is moved over to this side, it is
said to be a lee, or hard-a-lee.

ALEGAMBE (Philip), a celebrated Jesuit, born at
Brussels in 1592, distinguished himself by publishing
a Bibliotheca of the writers of his order, and died
at Rome in 1652.

ALEGRETE, a small town of Portugal, in A-
lestejo, on the confines of Port Alegre, on the river
Caja, which falls into the Guadiana, a little below Ba-
jadoz, near the frontiers of Spanish Estremadura. It
is a very pretty town, and finely situated; seven miles
south-east of Port Alegre, and thirty miles north of

ALESIUS CAMPUS (anc. geog.), a plain in Cil-
cis, on this side the river Pyramus, near the mountain
Chimera, famous for Bellerophon's wandering and pe-
riphering there, after being thrown off Pegusus; which
is the reason of the appellation.

ALEMANIA, or ALLEMANIA, (anc. geog.) a name
of Germany, but not known before the time of the
Antonines, and then used only for a part. After the
Marcomanni and their allies had removed from the
Rhine, a rabble, or collection of people from all parts
of Gaul, as the term Allemanni denotes, prompted ei-
erly or poverty, occupied the Agri, called
Decumanus by Tacitus, because they held them on a
title; now supposing to be the duchy of Wirtzbergh.
Such appear to be the small beginnings of Alemania,
which was in after-times greatly enlarged: but still
it was considered as a distinct part; for Caracalla,
who conquered the Alemani, assumed the surname
both of Alemaniacs and Germaniacs.

ALEMBARD, and officer in the court of the Grand
Signior, who bears the green standard of Mahomet,
when the sultan appears in public on any solemn occa-
sions.

ALEMBERT (John le Rond d'), an eminent
French philosopher, was born at Paris in 1717. He
derived the name of John le Rond from that of the
church near which, after his birth, he was exposed as
a foundling. His father, informed of this circum-
stance, listened to the voice of nature and duty, took
measures for the proper education of his child, and for
his future subsistence in a state of ease and indepen-
dence.

He received his first education in the College of the
Four Nations, among the Janenists, where he gave
early marks of capacity and genius. In the first year
of his philosophical studies, he composed a Commen-
tary on the epistle of St Paul to the Romans. The
Jamenists considered this production as an omen that
portended to the party of Port-Royal a reformation to
some part of their ancient splendor, and hoped to
find one day in M. d'Alembert a second Pascal.
To render this remembrance more complete, they engaged
their rising pupil in the study of the mathematics; but
they soon perceived that his growing attachment to
this science was likely to disappoint the hopes they
had formed with respect to his future destitution;
they, therefore, endeavoured to divert him from this
line; but their endeavours were fruitless.

At his leaving college, he found himself alone and
unconnected in the world; and sought an asylum in
the house of his nurse. He comforted himself with
the hope, that his fortune, though not ample, would bet-
ter the condition and subsistence of that family, which
was the only one that he could consider as his own:
Here, therefore, he took up his residence, resolving
to apply himself entirely to the study of geometry: And
here he lived, during the space of forty years, with the
greatest simplicity, discovering the augmentation of his
means only by encreasing displays of his benevolence,
concealing his growing reputation and celebrity from
these honest people, and making their plain and uncoutch
manners the subject of good-natured pleantry and
philosophical observation. His good nurse perceived
his ardent activity: heard him mentioned as the writer
of many books; but never took it into her head that
he was a great man, and rather beheld him with a kind
of compassion. "You will never," said she to him one
day, "be any thing but a philosopher—and what is a
philosopher?—a fool, who toils and plagues himself during
his life, that people may talk of him when he is no more."

As M. d'Alembert's fortune did not far exceed the
demands of necessity, his friends advised him to think
of a profession that might enable him to augment it.
He accordingly turned his views to the law, and took
his degrees in that line; but soon abandoned this plan,
and applied to the study of medicine. Geometry,
however, was always drawing him back to his
former pursuits, and after many ineffectual efforts to
refit its attractions, he renounced all views of a lucrative
profession, and gave himself over entirely to ma-
thematics and poverty.

In the year 1741 he was admitted member of the
Academy of Sciences, for which distinguished literary
promotion, at such an early age, he had prepared the
way by correcting the errors of a celebrated work,
which was deemed classical in France in the line of ge-
ometry. He afterwards fitted himself to examining, with
deep attention and acendency, what must be the motion
of a body which passes from one fluid into another
more dense, in a direction not perpendicular to the
surface separating the two fluids. Every one knows
the phenomenon which happens in this case, and which
amuses.
A L E

ALEMBERT amuses children under the denomination of Ducks and Drakes; but M. d'Alembert was the first who explained it in a satisfactory and philosophical manner.

Two years after his election to a place in the academy, he published his Treatise on Dynamics. The new principle developed in this treatise conflicted in establishing equality, at each instant, between the changes that the motion of a body has undergone, and the forces or powers which have been employed to produce them; or to express the thing otherwise, in separating into two parts the action of the moving powers, and considering the one as producing alone the motion of the body, in the second instant, and the other as employed to destroy that which it had in the first.

So early as the year 1744 M. d'Alembert had applied this principle to the theory of the equilibrium, and the motion of fluids; and all the problems before solved by geometers became, in some measure, its corollaries. The discovery of this new principle was followed by that of a new calculus, the first trials of which were published in a Discourse on the general Theory of the Winds, to which the prize-medal was adjudged by the academy of Berlin in the year 1746, and which was a new and brilliant addition to the fame of M. d'Alembert. This new calculus of partial differences he applied the year following, to the problem of vibrating chords, whose solution, as well as the theory of the oscillations of the air and the propagation of sound, had been given but incompletely by the geometers who preceded him, and these were his masters or his rivals.

In the year 1749 he furnished a method of applying his principle to the motion of any body of a given figure; and he solved the problem of the precession of the equinoxes, determined its quantity, and explained the phenomenon of the nutation of the terrestrial axis discovered by Dr. Bradley.

In 1752, M. d'Alembert published a treatise on the Resistance of Fluids, to which he gave the modest title of an Essay, but which contains a multitude of original ideas and new observations. About the same time he published, in the Memoirs of the Academy of Berlin, Researches concerning the Integral Calculus, which is greatly indebted to him for the rapid progress it has made in the present century.

While the studies of M. d'Alembert were confined to geometry, he was little known or celebrated in his native country. His connections were limited to a small society of selected friends; he had never seen any man in high office except M. d'Argencon. Satisfied with an income which furnished him with the necessities of life, he did not aspire after opulence or honours; nor had they been hitherto bestowed upon him, as it is easier to confer them on those who solicit them, than to look out for men who deserve them. His cheerful conversation, his smart and lively fallacies, a happy knack at telling a story, a florid mixture of malice of speech with good-nights of heart, and of delicacy of wit with simplicity of manners, rendered him a pleasing and interesting companion, and his company consequently was much sought after in the fashionable circles. His reputation, as length, made its way to the throne, and rendered him the object of royal attention and beneficence. He received also a pension from government, which he owed to the friendship of Count d'Argencon.

The tranquillity of M. d'Alembert was abated when his fame grew more extensive, and when it was known beyond the circle of his friends, that a fine and enlightened taste for literature and philosophy accompanied his mathematical genius. Our author's eloquent alibis to envy, detraction, and to other motives nearly as ungenerous, all the disapprobation, or opinion, and curriculum that M. d'Alembert met with an account of the publication of the famous Encyclopædia Dictionary of Arts and Sciences, in conjunction with Diderot. None more will refuse the well-merited tribute of applause to the eminent displays of genius, judgment, and true literary taste, with which M. d'Alembert has enriched the great work now mentioned. Among others, the Preliminary Discourse he has affixed to it, concerning the rift, profligates, connections, and affinities of all the branches of human knowledge, is perhaps one of the most capital productions of which the philosophy of the present age can boast. Nor will it be disputed, that the master-builders of this new and stupendous temple of science, for the worship of Nature, had also really in view the advancement of human knowledge, and the improvement of the arts and sciences. This, no brute, no candid philosopher, will call in question. But that in the inner court of this temple there was a confederacy formed against all those who looked higher than nature, for the principal object of their veneration and confidence, is a fact too palpable, too boldly avowed, to stand in need of any proof.

Some time after this, d'Alembert published his Philosophical, Historical, and Philological Miscellanies. These were followed by the Memoirs of Christina Queen of Sweden; in which M. d'Alembert showed that he was acquainted with the natural rights of mankind, and was bold enough to assert them. His Essay on the Intercourse of Men of Letters with persons high in Rank and Office, wounded the former to the quick, as it exposed to the eyes of the public the ignominy of those servile chains, which they feared to shake off, or were proud to wear. A lady of the court hearing one day the author accused of having exaggerated the deplorableness of the great, and the submission they require, answered illy, If he had confined me, I would have told him still more of the matter.

M. d'Alembert gave very elegant speciments of his literary abilities in his translation of some select pieces of Tacitus. But these occupations did not divert him from his mathematical studies; for about the same time he enriched the Encyclopædia with a multitude of excellent articles in that line, and composed his Researches on several important Points of the System of the World, in which he carried to a higher degree of perfection the solution of the problem of the perturbation of the planets, that had several years before been presented to the Academy.

In 1759 he published his Elements of Philosophy: a work exulted as remarkable for its precision and perspicuity; in which, however, are some tenets relative both to metaphysics and moral science, that are far from being admirable.

The remonstrance that was kindled (and the disputes that followed it) by the article Cenusus, inserted in the Encyclopædia,
ALEMBERT

Encyclopædie, he well known. M. d'Alembert did not leave this field of controversy with flying colours. Voltaire was an auxiliary in the contest; but as, in point of candour and decency, he had no reputation to lose; and as he weakened the blows of his enemies, by throwing both them and the speakers into fits of laughter, the issue of the war gave him little uneasiness. It fell more heavily on d'Alembert; and exposed him, even at home, to much contradiction and opposition.

It was on this occasion that the late king of Prussia offered him an honourable asylum at his court, and the place of president of his academy; and was not offended at his refusal of these distinctions, but cultivated an intimate friendship with him during the rest of his life. He had refused, some time before this, a proposal made by the empress of Russia to intrust him with the education of the Grand Duke:—a proposal accompanied with all the flattering offers that could tempt a man, ambitious of titles, or desirous of making an ample fortune; but the objects of his ambition were tranquillity and peace.

In the year 1765, he published his Differtation on the Distillation of the Jesuits. This piece drew upon him a swarm of adversaries, who confirmed the merit and credit of his work by their manner of attacking it.

Beside the works already mentioned, he published nine volumes of memoirs and treatises, under the title of Opuscula; in which he has solved a multitude of problems relative to astronomy, mathematics, and natural philosophy; of which our Panegyrist gives a particular account, more especially of those which exhibit new subjects, or new methods of investigation.

He published also Elements of Music, and rendered, at length, the system of Rameau intelligible; but he did not think the mathematical theory of the invariable body sufficient to account for the rules of that art. He was always fond of music; which, on the one hand, is connected with the most sublime and learned researches of rational mechanics; while, on the other, its power over the senses and the soul exhibits to philosophers phenomena no less singular and still more inexplicable.

In the year 1772 he was chosen secretary to the French academy. He formed, soon after this preferment, the design of writing the lives of all the deceased academicians, from 1700 to 1772; and in the space of three years he executed this design, by composing 70 eulogies.

M. d'Alembert died on the 29th of October 1783. There were many amiable lines of candour, modesty, dignity, and benevolence, in his moral character, which are described, with a diffusive detail, in his eulogy, by M. Condorcet, Histoire de l'Académie Royale des Sciences, 1783.

ALEMBIC, a chemical vessel usually made of glafs or copper, formerly used for distillation. The bottom part, which contained the subject for distillation, is called, from its shape, the conus; the upper part, which receives and condenses the steam, is called the head; the neck of which is fitted into the neck of a receiver. Retorts, and the common mors, are now generally employed.

ALEMBROTH, in the writings of the alchemists, a word used for a sort of fixed alkaline salt, which had the power of the famous alkahest, in dissolving bodies, opening the pores of most or all known substances, and thence, as well as by destroying sulphurs, promoting the separation of metals from their ores.—It is also used for a compound of corrosive mercury and sal ammoniac. See Chemistry.

ALENIO (Julius), a Jesuit, born at Brefcia in the republic of Venice. He travelled into the eastern countries; and arrived at Macao in 1610, where he taught mathematics. From thence he went to the empire of China, where he continued to propagate the Christian religion for thirty-six years. He was the first who planted the faith in the province of Xanfi, and he built several churches in the province of Fokien. He died in August 1649, leaving behind him several works in the Chinese language.

ALENTEJO, a province of Portugal, between the rivers of Tagus and Guadiana: the soil is very fertile, and the inhabitants laborious and industrious. The principal town is Évora.

ALENZON, a large handsome town of France, in lower Normandy, with the title of a duchy. It is surrounded with good walls, and flanked with towers. The castle was formerly a place of great consequence, and has held out long sieges. It has but one parish church, which has a bold and noble front. Among the nunneries, that of St Clair is most remarkable. It is seated on the river Sarte, in a vast open plain, which produces all sorts of corn and fruit. Near it there are quarries of stone fit for building, wherein are found a sort like Brtilot stones. The linen made at Alençon is very good, and sells at Paris. It is 20 miles north of Mans, 63 south-by-west of Rouen, and 88 south-west of Paris. W. Long. 9. 10. N. Lat. 48. 25.

ALEPPO, or HALAB, the capital of the Pachalic, and of all Syria; and the ordinary residence of the pacha, is situated in the vast plain which extends from the Orontes to the Euphrates, and which towards the south terminates in the desert. It is built on eight hills or eminences, on the highest of which the castle is erected, and is supposed to be the ancient Beram. This mount is of a conic form, and forms in a great measure to be raised with the earth thrown up out of a deep broad ditch which surrounds it. The suburbs to the north-north-east are next in height to this, and those to the west-north-west are much lower than the parts adjacent, and than any other part of the city. The houses are large and commodious, having terraces on their tops, and generally sky-lights in form of a dome to let the light into the rooms, which from their loftiness, the gliding on the window-shutters, cupboard-doors, &c. have at first entrance a very grand and agreeable effect. They are all so equal in height, that there are seldom any steps to ascend or descend in going from one house to another; while several large vaulted streets increase the facility of communication, by affording a passage to every part of the city free from the embarrassments of the open streets. They are carefully paved; have gutters and a foot-pavement on each side; and the middle of the street is laid with brick, the small end upwards, for the convenience of the horses. There is also a cleanliness observed here unknown to the other cities of Turkey, and which is not attended with the trouble of scavengers, there being
being ass-drivers who go about the city and take up the rubbish and dust, which each inhabitant is obliged to sweep together; and though the heat of the climate renders this labour more easy, the same heat obliges them to greater cleanliness, in order to preserve the salubrity of the air.

The mosques in Aleppo are numerous, and some few of them magnificent. Before each of them is an area, with a fountain in the middle, designed for ablutions before prayers; and behind some of the larger there are little gardens. There are many large khanis, or caravanseras, consisting of a capacious square, on all sides of which are a number of rooms, built on a ground-floor, used occasionally for chambers, ware-houses, or stables. Above these there is a colonade or gallery on every side, in which are the doors of a number of small rooms, wherein the merchants, as well strangers as natives, transact most of their business.

The bazaars or market-places are long covered narrow streets, on each side of which are a great number of small shops, just sufficient to hold the trademen and his goods, the buyer being obliged to stand without. Each separate branch of bazaars has a particular name, which is locked up, as well as the streets, an hour and a half after sun-set; but the locks are of wood, though the doors are cased with iron. The skeleton-houses are in the suburbs, open to the fields. The tanners have a khan to work in near the river. To the southward in the suburbs they burn lime; and a little beyond there is a village where they make ropes all year, of white glass, in the winter only; for the north is so cold as to make such work impossible.

The situation of Aleppo, besides the advantage of a rich and fruitful soil, polishes all that of a stream of fresh water, which never becomes dry. This rivulet, which is as large as that of the Gobelin at Paris, or the New River near London, rises in the mountains of Atabat, and terminates four leagues below Aleppo, in a morass full of wild boars and pelicans. Near Aleppo, its banks, instead of the naked rocks which cover them in the upper part of its course, are covered with a fertile earth, and laid out ill gardens, or rather orchards, which, in a hot country, and especially in Turkey, cannot but be delightful. The city is in itself one of the most agreeable in Syria, and is perhaps the cleanest and best built of any in Turkey. On whatever side it is approached, its numerous minarets and domes present an agreeable prospect to the eye, fatigue with the continued sameness of the brown and parched plains. In the centre is an artificial mountain surmounted by a dry ditch, on which is a ruinous fortress. From hence we have a fine prospect of the whole city, and to the north discover the snowly tops of the mountains of Balian; and on the west, those which separate the Orontes from the sea; while to the south and east, the eye can discern as far as the Ephrates. In the time of Omar, this castle stopped the progress of the Arabs for several months, and was at last taken by treachery, but at present would not be able to retch the feeble assails. Its flight wall, low, and without a battery, is ruin; its little old towers are in no better condition; and it has not four canons fit for service, not excepting a culverine nine feet long, taken from the Persians at the siege of Baibars. Three hundred and fifty Janisaries, who should form the garrison, are busy in their shops, and the aga strongly finds room in it to lodge his retinue. It is remarkable that this aga is named immediately by the Porte, which, ever suspicious, divides as much as possible the different offices. Within the walls of the castle is a well, which, by means of a subterraneous communication, derives its water from a spring a league and a quarter distant. In the environs of the city, we find a number of large square stones, on the top of which is a turban of stone, which are so many tombs. There are many rising grounds round it, which, in cafe of a siege, would greatly facilitate the approaches of the assailants. Such, among others, is that on which the house of the Derviches stands, and which commands the canal and the rivulet: Aleppo, therefore, cannot be esteemed a place of importance in war, though it be the key of Syria to the north; but, considered as a commercial city, it has a different appearance. It is the emporium of Armenia and the Parthians; sends caravans to Bagdad and into Persia; and communicates with the Persian Gulf and India, by Baibars, with Egypt and Mecca by Damascus, and with Europe by Skardaron (Alexandretta) and La-Takita. Commerce is there principally carried on by barter. The chief commodities are raw or spun cottons, clumsy linens fabricated in the villages; silk stuffs manufactured in the city, copper, boners (coarse cloths) like those of Rouen, goats hair brought from Nalolia; the gall nuts of the Kourdfán, the merchandise of India, such as fawls and mufkins, and parsley nuts of the growth of the neighbourhood. The articles supplied by Europe are the Languedoc cloths, cochineal, indigo, fugar, and some other groceries. The coffee of America, though prohibited, is introduced, and serves to mix with that of Mocha. The French have at Aleppo a confidant and seven counting-houses; the English and the Venetians two, and the merchants of Leghorn and Holland one. The emperor appointed a consul there in 1784, in the person of a rich Jew merchant, who shewed his beard to assume the uniform and the sword. Rose-filla has also lent one very lately. Aleppo is not exceeded in extent by any city in Turkey, except Constantinople and Cairo, and perhaps Smyrna. The number of in inhabitants has been computed at 200,000; but in these calculations certainty is impossible. However, if we observe that this city is not larger than Nantes or Markilles, and that the houses consist only of one storey, we shall perhaps not think it probable they exceed 100,000. The people of this city, both Turks and Christians, are with reason esteemed the most civilized in all Turkey; and the European merchant no where enjoy so much liberty, or are treated with so much respect.

The air of Aleppo is very dry and piercing, but at the same time very exhilarating for all who are not troubled with asthmatic complaints. The city, however, and the environs, are subject to a singular endemical disorder, which is called the ringworm or pimple of Aleppo; it is in fact a small white pimple behind a pimple, inflammatory, and at length becomes an ulcer of the size of the nail. The usual duration of this ulcer is one year;
it commonly fixes on the face, and leaves a fear which disfigures almost all the inhabitants. It is alleged that every stranger who resides there three months is attacked with it: experience has taught that the best mode of treatment is to make use of no remedy. No reason is assigned for this malady: but M. Volney suspects it proceeds from the quality of the water, as it is likewise frequent in the neighbouring villages, in some parts of the Diarbekar, and even in certain districts near Damascus, where the soil and the water have the same appearances. Of the Christian inhabitants the greater number are Greeks, next to them the Armenians, then the Syrians, and lastly the Maonies; each of whom have a church in the city called Hadela; in which quarter, and the parts adjacent, most of them reside. The common language is the vulgar Arabic, but the Turks of condition use the Turkish. Most of the Armenians can speak the Armenian, some few Syrians understand Syrian, and many of the Jews Hebrew; but scarce one of the Greeks understands a word of Greek. The people in general are of a middle stature, and tolerably well proportioned; but they seem neither vigorous nor active. Both sexes are handsome when young; but the beard soon disfigures the men: and the women, as they come early to maturity, also fade soon; females are generally married from 14 to 18 years of age, and many under 14. The people of rank here are polite and affable, making allowances for that superiority which the Mahometan religion inculcated to them over all who hold a different faith. Their bread is generally of wheat flour made into thin cakes, but very ill prepared, and is generally eaten as soon as it comes out of the oven. The principal people have some loaves of a finer flour, which are well fermented and baked. Besides these, there are a variety of biscuits, most of which are fried on the top with some kind of seeds. The Europeans have very good bread, baked and prepared in the French manner. All the inhabitants of both sexes smoke tobacco to great excess; even the very servants have almost constantly a pipe in their mouths. Coaches or carriages are not used here; therefore persons of quality ride on horseback in the city, with a number of servants walking before them, according to their rank: ladies of the first distinction are even compelled to walk on foot in the city, or to any place at a moderate distance; in longer journeys they are carried by mules, in a kind of a couch clove covered up. There are a number of public bagnios in this city, which are used by people of all ranks, except those of the highest distinction, who commonly have baths and every other convenience in their own houses. Aleppo is 70 miles east of Scandaron, on the sea-coast, and 175 north-by-east of Damascus. E. Long. 37. 40. N. Lat. 36. 12.

ALEPPO (the Pachalie of), one of the five governments into which Syria is divided. It comprehends the country extending from the Euphrates to the Mediterranean, between two lines, one drawn from Scandaron to Beer, along the mountains; the other from Beles to the sea, by Marsa and the bridge of Shogor. This space principally consists of two plains; that of Amtiach to the west, and that of Aleppo to the east; the north and the sea coast are occupied by considerably high mountains, known to the ancients by the names of Amanus and of Rhoüs. In general, the foil of this government is fat and loamy. The lofty and vigorous plants which shoot up everywhere after the winter rains prove its fertility, but its actual fruitfulness is but little. The greatest part of the lands lie waste; scarcely can we trace any marks of cultivation in the environs of the towns and villages. Its principal produce consists in wheat, barley, and cotton, which are found especially in the flat country. In the mountains, they rather choose to cultivate the vine, mulberry, olive, and fig trees. The sides of the hills towards the sea-coast are appropriated to tobacco, and the territory of Aleppo to piñacchios. The pastureage is not to be reckoned, because that is abandoned to the wandering hordes of the Turkmen and Curds.

In the greater part of the pachalics the pacha is, as his title imports, at once the viceroy and farmer general of the country; but in that of Aleppo he does not possess the latter office. This the Porte has bestowed on a mollah, or collector, who is immediately accountable for what he receives. His lease is only for a year. The present rent of his farm is 800 purses (above L.40,000); but to this must be added the price of the babouch (Turkish flippers), or a present of three or four thousand pounds, to purchase the favour of the vizir and men in office. For these two sums the farmer receives all the duties of the government; which are, first, The produce of import and export duties on merchandise coming from Europe, India, and Constantinople, and on that exported in exchange. Secondly, The taxes paid by the herds of cattle brought every year by the Turkmen and Curds from Armenia and the Diarbekar, to be sold in Syria. Thirdly, The fifth of the salt-works of Djeboul. And lastly, the mir, or land-tax. These united may produce about L.60,000.

The pacha, deprived of this lucrative branch of the administration, receives a fixed allowance of about L.800. This revenue has always been inadequate to the expenses; for, besides the troops he is obliged to maintain, and the repairation of the highways and fortresses, the expenses of which he is obliged to defray, he is under the necessity of making large pre­fents to the ministers, in order to keep his place; but the Porte adds to the account the contributions he may levy on the Curds and Turkmen, and his extortions from the villages and individuals; nor do the pachas come short of this calculation. Abdi Pacha, who governed 13 or 14 years ago, carried off, at the end of 15 months, upwards of L.160,000, by laying under contribution every trade, even the very cleaners of tobacco-pipes; and very lately another of the same name has been obliged to fly for similar oppressions. The former was rewarded by the divan with the command of an army against the Russians; but if the latter has not enriched himself, he will be strangled as an extortioner. Such is the ordinary progress of affairs in Turkey!

In consequence of such wretched government, the greater part of the pachalics in the empire are impoverished and laid waste. 1 his is the case in particular with that of Aleppo. In the ancient dejters, or regis­ters of impotts, upwards of 320 villages were reck­oned; but at present the collector can scarcely find 400. Such of our merchants as have resided there 20 years, have themselves seen the greater part of the environs
ALE

A town was of such antiquity, that Diodorus Siculus relates it was built by Hercules. It is supposed to be the city of Ales, in the duchy of Burgundy, not far from Dijon.

ALET, a town of France, in Lower Languedoc, with a bishop's see. It is remarkable for its baths, and for the grains of gold and silver found in the stream which runs from the Pyrenean mountains, at the foot of which it stands. It is seated on the river Aude, 15 miles S. of Carcassonne, and 37 N. W. of Narbonne. E. Long. 2. 5. N. Lat. 42. 59.

ALETRIS, in botany, a genus of the monogynia order, belonging to the hexandria class of plants, and in the natural method ranking under the 10th order, Coronarie. The characters are: The corolla is monopetalous, funnel-shaped, hexangular, much corrugated, feathery, and persistent: The stamina consists of six filaments, the length of the corolla, and infixed into the base of the divisions of the corolla; the anther are oblong and erect: The pistils has an ovate, white, and hairy stigma: The pericarp is an ovated capsule, triquetrous, pointed, and triocular: The seeds are numerous. Of this genus botanical writers enumerate five.

Species. 1. The farinosa, a native of Virginia, and other parts of North America. 2. The capensis, a native of the Cape of Good-Hope. 3. The hyacinthoides, or Guiana aloe. 4. The zeylanica, or Ceylon aloe. 5. The fragrans, or tree-aloe, a native of Africa. Of these only the first is so hardy as to outlive the winter in Britain, unless placed in a flower; and even this requires to be sheltered under a frame. The flowers appear in June or July, of a white-green colour. The third and fifth produce fine spikes of white flowers; those of the third kind appearing in July, of the fifth in March or April. By proper management the last kind becomes a flatly plant, rising to the height of 12 or 14 feet; the flowers open wide in the evening, and perfume the air of the flower. These breed out one or two heads, or tubers, towards their tops, which may be cut off; and after they have lain a week in the flower to heal the wounded parts, they may be planted for increase. The other species seldom or never flower in Britain, nor does their appearance otherwise merit notice.

ALIUM, or ALES, (anc. geog.), a town of Celtic Gaul, now extinct. From its ruins arose St. Malo, in Brittany, at the distance of a mile. Its ruins are called Lauch Aeth in the British.

ALEUROMANCY, the name with what was otherwise called alphtomantrix, and eridhomantia, and means an ancient kind of divination performed by means of meal or flour.

ALEXANDER THE GREAT, king of Macedonia. His father Philip laid the plan of that extensive empire, which his son afterwards executed. Philip, having made himself master of Greece, began to cast his eyes upon Persia, with a view to retaliate upon that haughty empire the injuries of former times. It was the popular topic of the day. But this prince was cut off in the midst of his enterprise. Such, however, was the influence of Alexander in the assembly of the Greek states, that he was created general of their combined forces in the room of his father. Having made every needful
Alexander needful preparation, at the head of a veteran army he invaded Asia. The lieutenants of Darius, who was then king of Persia, opposed him at the river Granicus, where Alexander obtained a complete victory; after which he pursued his march through Asia. At Ilius, near Scandereroon, he was met by Darius in person, at the head of a prodigious army. Here he obtained a second victory; and took the camp of Darius, together with his family, whom he treated with the utmost humanity. Contrary to all the maxims of war, instead of pursuing Darius, he made an excursion into Egypt; and, as far as appears, through no better motives than those of vanity. Here he was acknowledged to be the son of Jupiter Ammon. In the mean time Darius recruited his strength, and got together an army superior to what he brought into the plain of Ilius. Alexander having finished his Egyptian expedition, traversed Asia, and passed the Euphrates. At Arbela, a town in Assyria, he met Darius. Here a decisive battle was fought, which put all Persia into the hands of Alexander. His ambition not being satisfied with the conquest of that vast country, he projected an expedition into India. Here he met with great opposition from Porus, a gallant prince, whom in the end he reduced. Beyond the Ganges lay a country still unfrequented. He notified it to his army, that he proposed to pass the river: But these veterans, harried with the fatigues, and seeing no end of their labour, mutinied, and refused to march further. The disappointed chief was therefore obliged to return. At Babylon he proposed to receive ambassadors, appoint governors, and settle his vast monarchy; but his ex cesses put an end to his life in the midst of his dignity, and in the flower of his age.

The character of this hero is so familiar to every body, that it is almost needful to labour to draw it. All the world knows, says Mr. Bayle, that it was equally composed of very great virtues and very great vices. He had no mediocrity in any thing but his fate: in his other properties, whether good or bad, he was all extremes. His ambition rose even to madness. His father was not at all mistaken in supposing the bounds of Macedon too small for his son: for how could Macedon bound the ambition of a man, who reckoned the whole world too small a dominion? He wept at hearing the philosopher Anaxarchus say, that there was an infinite number of worlds: his tears were owing to his desire of conquering them all, since he had not yet been able to conquer one. Livy, in a short digression, has attempted to enquire into the events which might have happened, if Alexander, after the conquest of Asia, had brought his arms into Italy? Doubtless things might have taken a very different turn with him; and all the grand projects, which succeeded so well against an effeminate Persian monarch, might easily have miscarried if he had had to do with rough hardy Roman armies. And yet the vast aims of this mighty conqueror, if seen under another point of view, may appear to have been confined in a very narrow compass: since, as we are told, the utmost wish of that great heart; for which the whole earth was not big enough, was, after all, to be praised by the Athenians: for it is related, that the difficulties which he encountered in order to pass the Hydaspes, forced him to cry out, "O Athenians, could you believe to what dangers I expose myself for the sake of being celebrated by Alexander?" But Bayle affirms, that this was quite consistent with the vast unbounded extent of his ambition, as he wanted to make all future time his own, and be an object of admiration to the latest posterity. Yet did not expect this from the conquests of worlds, but from books. He was perfectly in the right, says Bayle; "for if Greece had not furnished him with good writers, he would long ago have been as much forgotten, as the kings who reigned in Macedon before Amphitryon."

Alexander has been praised upon the score of continuency, yet his life could not lurely be quite regular in that respect. Indeed the fire of his early youth appeared to cold towards women, that his mother supposed him to be impotent; and, to satisfy her self in this point, did, with the consent of Philip, procure a very handsome courtezana to lie with him, whose car redresses, however, were all to no purpose. His behaviour afterwards to the Persian captives shows him to have had a great command over himself in this particular. The wife of Darius was a finifhied beauty; her daughters likewise were all beauties; yet this young prince, who had them in his power, not only bestowed on them all the honours due to their high rank, but managed their reputation with the utmost delicacy. They were kept as in a cloyster concealed from the world, and secured from the reach of every dishonourable (not only attack, but) imputation. He did not give the least handle to scandal, either by his visits, his looks, or his words: and for other Persian dames his prifoners, equally beautiful in face and figure, he contented himself with paying gaily, that they gave indeed much pain to his eyes. The amoun Thalestris could not obtain from him a compliance with her gallant request till after a delay of thirteen days. In the mean time, what are we to conclude from his cauing his favourite mistres Pancrate to be drawn naked by Apelles, tho' it is true he gave her to the painter, who fell in love with her? What of that immoderate love of boys, which Athenæus relates of him? What of that prodigious number of wives and concubines which he kept?

His excesses with regard to wine were notorious, and beyond all imagination; and he committed, when drunk, a thousand extravagancies. It was owing to wine, that he killed Clytus who saved his life, and burnt Persepolis, one of the most beautiful places of the East: he did this last indeed at the instigation of the courtezana Thalestris; but this circumstance made it only the more heinous. It is generally believed, that he died by drinking immoderately; and even Plutarch, who affects to contradict it, owns that he did nothing but drink the whole day he was taken ill.

In short, to sum up the character of this prince, we cannot be of opinion, that his good qualities did in any way compensate for his bad ones. Heroes make a noise: their actions glare, and make the senses forcibly; while the infinite destruction and misery they occasion lies more in the shade, and out of sight. One good legislator is worth all the heroes that ever did or will exist. See Macedon.
Alexander, afterwards at Rome; but he devoted all the time he could spare to the study of polite literature; and at length he entirely left the bar, that he might lead a more easy and agreeable life with the muses. The particular of his life are to be gathered from his work intitled Genialiam Diarium: We are there informed that he lodged at Rome, in a house that was his mother's, and he relates many surprising particulars about the ghost; he lays also, that when he was very young, he went to the lectures of Philo analytics, who explained at Rome the Tuscanian questions of Cicero; he was there also when Nicholas Perot and Domitius Calderinus read their lectures upon Martial. The particular time when he died is not known; but he was buried in the monastery of the Olivets. Tirioque wrote a learned commentary upon his work, which was printed at Lyons in 1587, and reprinted at Leyden in 1673, with the notes of Dennis Godfrey, Christopher Colerus, and Nicholas Mercerus.

Alexander (Neckham), an eminent English writer in the 12th and 13th centuries, born at St. Albans in Hertsfordshire. In 1215 he was made abbot of Exeter, and died in 1227. He wrote several works, which were never published; but they are to be found in manuscript in the libraries of England and other countries.

Alexander (Noel), an indefatigable writer of the 17th century, born at Roan in Normandy, 1639. After finishing his studies at Roan, he entered into the order of Dominican friars, and was professed there in 1655. Soon after he went to Paris, to go through a course of philosophy and divinity in the great convent, where he distinguished himself so, that he was appointed to teach philosophy there, which he did for 12 years. Mr. Colbert showed him many marks of his esteem: and being determined to omit nothing to perfect the education of his son, afterwards archbishop of Roan, he formed an assembly of the most learned persons, whole conferences upon ecclesiastical history might be of advantage to him. Father Alexander was invited to this assembly, where he exerted himself with so much genius and ability, that he gained the hand of young Colbert, who showed him the utmost regard as long as he lived. These conferences gave rise to Alexander's design of writing an ecclesiastical history: for, being desirous to reduce what was material in these conferences to writing, he did it with so much accuracy, that the learned men who composed this assembly, advised him to undertake a complete body of church-history. This he executed with great assiduity, collecting and digesting the materials himself, and writing even the tables with his own hand. He at last completed his work in 1686. Towards the latter part of his life, he was afflicted with the loss of his sight; a most inexpressible misfortune to one whose whole pleasure was in study, yet he bore it with great patience and resignation. He died merely of a decay of nature, 1724, in the 84th year of his age.

Alexander Severus, emperor of Rome, succeeded Hellogabalus about A.D. 222, when but 16 years of age. His mother's name was Mammæa, and by her advice he in a great measure regulated his conduct. He applied himself to the reformation of abuses, the state having been greatly disorderly by the vicious conduct of his predecessor; he was a most strict lover of justice, an encourager of learning and learned men, and to Alexander vorable to the Christians. He made a successful expedition against the Persians; but endeavouring to reform his troops, which had grown very licentious under the late bad government, they murdered him at the instigation of Maximinus in the 29th year of his age, together with his uncle, A.D. 1,192.

Alexander VI. (Pope), had four ballards when he was cardinal, for one of which he had so great affection, that he stuck at nothing to raise him. Designing to poison some cardinals, he was poisoned himself, A.D. 1503. See Borgia.

Alexander VII. (Pope), See Chigi.

Alexander Bishop of Lincoln in the reigns of Henry I. and Stephen, was a Norman by birth, and nephew of the famous Roger, bishop of Salisbury, who first made him archdeacon of Salisbury, and afterwards, by his interest with the king, raised him to the nitre. Alexander was consecrated at Canterbury, July 22, 1123. Having received his education under his uncle, the bishop of Salisbury, and been accustomed to a splendid way of living, he affected show and state more than was suitable to his character, or consistent with his fortunes. This failing excepted, he was a man of worth and honour, and every way qualified for his station. The year after his consecration, his cathedral church at Lincoln having been accidentally burnt down, he rebuilt it, and secured it against the like accident for the future by a stone roof. This prelate increased the number of prebends in his church, and augmented its revenues with several manors and estates. In imitation of the barons and some of the bishops, particularly his uncle the bishop of Salisbury, he built three castles; one at Banbury, another at Sleaford, and a third at Newark. He likewise founded two monasteries; one at Haverholm, for regular canons and nuns together, the other at Tame for white-friars. He went twice to Rome in the years 1142 and 1144. The first time, he came back in quality of the pope's legate, for the calling a synod, in which he published several wholeome and necessary canons. In August 1147, he took a third journey to the pope, who was then in France; where he fell sick through the excessive heat of the weather, and returning with great difficulty to England, he died in the 24 year of his prelacy.

Alexander (William), earl of Stirling, an eminent Scots statesman and poet in the reigns of James VI. and Charles I. who, after travelling with the duke of Argyle as his tutor or companion, wrote a poetical complaint of his unsuccessful love of some beauty, under the title of Aurora. He then removed to the court of James VI. where he applied to the more solid parts of poetry, forming himself upon the plan of the Greek and Roman tragedians. In 1607, he published some dramatic performances, intitled The Monarchic Tragedies, dedicated to king James; who was so well pleased with them, as to call him his philosophical poet. After this, he is said to have written A Supplement to [duplicate text removed] the third part of Sir Philip Sidney's Arcadia; and in 1613, he produced a poem called Doomsday, or the Great Day of Judgement. He was made gentleman-at-arms to prince Charles, and master of the requites; was knighted; and obtained a grant of Nova Scotia, where he projected the settlement of a colony, but afterward sold it to the French. In 1626, he was made secretary of state for Scotland;
ALE

Alexander Scottland; was created first viscount, and then earl, of Stirling; and died in 1640.

ALEXANDER I. (St), whom St Ireneus reckons the fifth bishop of Rome, succeeded St Evarifrus in the year 119, and died in the year 119. There is no account of his life; and the epistles which are attributed to him are spurious.

ALEXANDER II. king of Scotland, succeeded his father William in 1213, at 16 years of age. He made an expedition into England, to oppose the tyranny of King John; who returned the visit, and was offered battle by Alexander, but refused it. He took the city of Carlisle from Henry III. which was afterwards exchanged for Berwick. Alexander died in 1249, in the 51st year of his age, and 35th of his reign; and left for his successor, his son—

ALEXANDER III. who was crowned king of Scotland in 1249. The Cummings, lords of Scotland, took arms against him; and taking him prisoner, confined him at Stirling; but he was afterwards released by his subjects. He married the daughter of Henry III. king of England; and was at length killed by a fall from his horse, on the 10th of April 1290, after having reigned 42, or according to others 37 years.

ALEXANDERS, in botany. See SMYRNA.

ALEXANDREA, (anc. geog.) a mountain of Mylia, on the sea-coast, forming a part of mount Ida, where Paris gave judgment on the three goddesses.

ALEXANDRETTA, by the Turks called Scanderon; a town in Syria, at the extremity of the Mediterranean sea. It is the port of Aleppo, from which it is distant 28 or 30 leagues. It is now, properly speaking, nothing else but a village, without walls, in which the tombs are more numerous than the houses, and which entirely owes its existence to the road which it commands. This is the only road, in all Syria, where vessels anchor on a solid bottom, without their cables being liable to chance; but in other respects it has many inconveniences. It is infested, during winter, by a peculiar wind, called by the French sailors le Regnier, which blowing from the snowy summits of the mountains, frequently forces ships to drag their anchors several leagues. And when the snow begins to cover the mountains which surround the Gulf, tempestuous winds arise which prevent vessels from entering for three or four months together. The road also to Aleppo by the plain is infested by Cud robbers, who conceal themselves in the neighboring rocks, and frequently attack and plunder the strongest caravans. But the worst circumstance is the extreme unwholesomeness of the air, occasioned here by stagnant waters and mephitic exhalations. It may be affirmed, that this every year carries off one-third of the crews of the vessels which remain here during the summer; nay, ships frequently lose all their men in two months. The fever for this epidemic disorder is principally from May to the end of September; it is an intermitting fever of the most malignant kind; and is accompanied with obstructions of the liver, which terminate in a dropsy. To this baneful epidemic, Alexan- dretta, from its situation, seems to be irremediably condemned: for the plain on which the town is built is low and flat, that the rivulets, finding no declivity, can never reach the sea. When they are swelled by the winter rains, the sea, swelled likewise by tempests, hinders their discharging themselves into it; whence their waters, forced to spread themselves, form lakes in the plain. On the approach of the summer, the waters becoming corrupted by the heat, exhale vapours equally corrupt, and which cannot disperse, being confined by the mountains that encircle the gulf. The entrance of the bay besides lies to the west, which in those countries is the most unhealthy exposure when it corresponds with the sea.

The labour necessary to remedy this would be immense; and after all insufficient; and, indeed, such an undertaking would be absolutely impossible under a government like that of the Turks. A few years ago, Mr Volney informs us, the merchants of Aleppo, disgusted with the numerous inconveniences of Alexandretta, wished to abandon that port and carry the trade to Latakia. They proposed to the Paşa of Tripoli to repair the harbour at their own expense, provided he would grant them an exemption from all duties for ten years. To induce him to comply with their request, the agents they employed talked much of the advantage which would, in time, result to the whole country:—

"But what signifies it to me what may happen in time," replied the Paşa? "I was yesterday at Marach; to-morrow, perhaps I shall be at Djedda: Why should I deprive myself of present advantages, which are certain, for future benefits I cannot hope to parake?" The European factors were obliged therefore to remain at Scanderoon. There are three of these factors, two for the French, and one for the English and Venetians. The only curiosity which they have to amuse strangers with consists in six or seven marble monuments, sent from England, on which you read: Here lies such a one carried off in the flower of his age, by the fatal effects of a contagious air. The sight of these is the more disfavouring, as the languid air, yellow complexion, livid eyes, and droptical bellies of those who show them, make it but too probable they cannot long escape the same fate. It is true, they have some reissue in the village of Baslan, the pure air and excellent waters of which surprizingly restore the sick. The sea, for some years past, has applied the duties of the cemetary of Alexandretta to his own use, and rendered himself almost independent of the Pacha of Aleppo. The Turkish empire is full of such rebels, who frequently die in peaceable possession of their usurpations.

ALEXANDRIA, now Scanderon, by Athanasius called Xpore; a city of Lower Egypt, and for a long time its capital. This city was built by Alexander the Great, soon after the overthrow of Tyre, about 333 years before Christ. It is situated on the Mediterranean, twelve miles west of that mouth of the Nile anciently called Ganapium; and lies in E. Long. 30° 19'. N. Lat. 31° 10'.

Alexander is said to have been induced to build this city, on account of its being conveniently situated for a fine port; and so sudden was his resolution, that after he had directed where every public structure was to be placed, fixed the number of temples, and the duties to whom they should be dedicated, &c. there were no instruments at hand proper for marking out the walls, according to the custom of those times. Upon this, a workman advised the king to collect what meal was among the soldiers, and to lift it 1: lines upon the ground, whereby the circuit of the walls would be sufficiently marked out. This advice was followed;
Alexandria and the new method of marking out the walls was, by Arifander, the king's tooth-filer, interpreted as a preface of the city's abounding with all the necessities of life. Nor was he deceived in his prediction; for Alexandria soon became the staple not only for merchandise, but also for all the arts and sciences of the Greeks. Alexandria was a league and a half long, third in breadth, which made the circumference of its walls about four leagues. Lake Maroitis bathed its walls on the south, and the Mediterranean on the north. It was intersected lengthwise by straight parallel streets. This direction left a free passage to the northerly wind, which alone conveys coolness and refreshment into Egypt. A street of 2000 feet wide began at the gate of the sea, and terminated at the gate of Canopus. It was decorated by magnificent houses, by temples, and by public buildings. In this extensive range the eye was never tired with admiring the marble the porphyry, and the obelisks, which were destined at some future day to embellish Rome and Constantinople. This street, the handomest in the universe, was intersected by another of the same breadth, which formed a square at their junction of half a league in circumference. From the middle of this great place, the two gates were to be seen at once, and vessels arriving under full sail from the north and from the south.

A mole of a mile in length stretched from the continent to the isle of Pharos, and divided the great harbour into two. That which is to the northward preserved its name. A dyke drawn from the isle to the rock whereon was built the Pharos, secured it from the westerly winds. The other was called Eunostus, or the Safe return. The former is called at present the new, the latter the old harbour: a bridge that joins the mole to the city, served for a communication between them. It was raised on lofty pillars sunk into the sea, and left a free passage for ships. The palace, which advanced beyond the promontory of Lochias, extended as far as the dyke, and occupied more than a quarter of the city. Each of the Ptolemies added to its magnificence. It contained within its inclosure, the museum, an asylum for learned men, groves and buildings worth in royal majesty, and a temple where the body of Alexander was deposited in a golden coffin. The infamous Seccacus Clybotes violated this monument, carried off the golden coffin, and put a glass one in its place. In the great harbour was the little island of Anti-Rhodes, where stood a theatre, and a royal palace of residence. Within the harbour of Eunoios was a smaller one, called Kibotos, dug by the hand of man, which communicated with Lake Mareotis by a canal. Between this canal and the palace was the admirable temple of Serapis, and that of Neptune near the great place where the market was held. Alexandria extended Likewise along the southern banks of the lake. Its eastern part preferred to view the gymnasium, with its porticoes of more than 606 feet long, supported by several rows of marble pillars. Without the gate of Canopus was a spacious circus for the chariot races. Beyond that, the suburb of Nicopolis ran along the sea-shore, and seemed a second Alexandria. A superb amphitheatres was built there with a race-ground, for the celebration of the quinquennalia.

Such is the description left us of Alexandria by the ancients, and above all by Strabo.

The architect employed by Alexander in this undertaking was the celebrated Dicosrates, who had acquired much reputation by rebuilding the temple of Diana at Ephesus. The city was first rendered populous by Ptolemy Soter, one of Alexander's captains, who, after the death of the Macedonian monarch, being appointed as governor of Egypt, assumed the title of king, and took up his residence at Alexandria, about 304 years before Christ.

In the 30th year of Ptolemy Soter's reign, he took his son Ptolemy Philadelphus partner with him in the empire; and by this prince the city of Alexandria was much embellished. In the first year of his reign the famous watch-tower of Pharos was finished. It had been begun several years before by Ptolemy Soter; and, when finished, was looked upon as one of the wonders of the world. The same year, the island of Pharos itself, originally seven forlongs distant from the continent, was joined to it by a cuteway. This was the work of Desiphanes, who completed it at the same time that his son put the last hand to the tower. The tower was a large square structure of white marble; on the top of which fires were kept constantly burning, for the direction of sailors. The building cost 800 talents; which, if Attic, amounted to L. 165,000 sterling, if Alexandrian, to twice that sum.

The architect employed in this famous structure fell upon the following contrivance to usurp the whole glory to himself.—Being ordered to engrave upon it the following inscription, "King PTOLEMY to the Gods the Saviours, for the benefit of Sailors;" instead of the king's name he substituted his own, and then filling up the hollow of the marble with mortar, wrote upon it the above-mentioned inscription. In process of time, the mortar being wore off, the following inscription appeared: "SOSTRATUS the CNIEN, the son of DEXIPHANES, to the Gods the Saviours, for the benefit of Sailors."

This year also was remarkable for the bringing of the image of Serapis from Pontus to Alexandria. It was set up in one of the suburbs of the city called Rhodos, where a temple was afterwards erected to his honour, suitable to the greatness of that fatal and wondrous city. At Alexandria it was called and worshipped there, Serapeum. This structure, according to Ammianus Marcellinus, surpassed in beauty and magnificence all others in the world, except the capital at Rome.

Within the verge of this temple was the famous Alexandrian library. It was founded by Ptolemy Soter, for the use of an academy he instituted in this city; and, by continual additions by his successors, became at last the finest library in the world, containing no fewer than 700,000 volumes. The method followed in collecting books for this library, was, to seize all those which were brought into Egypt by Greeks or other foreigners. The books were transcribed in the museum by persons appointed for that purpose; the copies were then delivered to the proprietors, and the originals laid up in the library. Ptolemy Euergetes, having borrowed from the Athenians the works of Sophocles, Euripides, and Eschylus, returned them only the copies, which he caused to be transcribed in as beautiful a manner as possible; presenting the Athenians at the same time with fifteen talents (upwards of L. 300 Sterling) for the exchange.
As the museum was at first in that quarter of the city called Bucchion, near the royal palace, the library was placed there likewise; but when it came to contain 400,000 volumes, another library, within the Serapeum, was erected by way of supplement to it, and on that account called the daughter of the former. In this second library 500,000 volumes, in process of time, were deposited; and the two together contained the 700,000 volumes already mentioned. In the war carried on by Julius Caesar against the inhabitants of this city, the library in the Bucchion, with the 400,000 volumes it contained, was reduced to ashes. The library in the Serapeum, however, still remained, and here Cleopatra deposited 200,000 volumes of the Pergaman library, which Marc Antony preferred her with. These, and others added from time to time, rendered the new library at Alexandria more numerous and considerable than the former; and though it was often plundered during the revolutions and troubles of the Roman empire, it yet was again and again repaired, and filled with the fame number of books.

For 253 years Alexandria was held in subjection by the Ptolemies. Here is a list of these princes, with the dates of their respective reigns:

- Ptolemy the son of Lagus, named Soter, reigned 29 years, and died in the year 3720. Ptolemy Philadiphus reigned 35 years, and died in 3758. Ptolemy Euergetes reigned 25 years, and died in 3783. Ptolemy Philopater reigned 17 years, and died in 3800. Ptolemy Epiphanes reigned 24 years, and died in 3824. Ptolemy Philometer reigned 37 years, and died in 3861. Ptolemy Euergetes, or Phylcon, reigned 13 years, part with his brother Philometer and part alone. He died in 3888. Ptolemy La-thyrus reigned 36 years six months. He died in 3923. Cleopatra, the daughter of Lathyrus and wife of Alex­ander I, reigned six months. Alexander I, the nephew of Lathyrus, was established in 3924 and died in 3943. Alexander II, the son of Alexander I, was dispossessed by the Alexandrians in 3939. Ptolemy Nothus, or Auletes, the son of Lathyrus, reigned 13 years, and died in 3953. Ptolemy, named Dion­y­sius or Bacehos, reigned three years eight months, and died in 3957. Cleopatra reigned from 3957, and killed herself in 3974.

This city, as we have already observed, soon became extremely populous, and was embellished both by its own princes and the Romans; but, like most other noted cities of antiquity, had been the seat of terrible massacres. About 141 years before Christ, it was almost totally depopulated by Ptolemy Phylcon. That barbarous monster, without the least provocation, gave free liberty to his guards to plunder his metropolis and murder the inhabitants at their pleasure. The cruelties practised on this occasion cannot be expressed; and the few who escaped were so terrified that they fled into other countries. Upon this, Phylcon, that he might not reign over empty houses, invited other strangers from the neighbouring countries; by whom the city was repeopled, and soon recovered its former splendor. On this occasion many learned men having been obliged to fly, proved the means of reviving learning in Greece, Asia Minor, the islands of the Archipelago, and other places, where it was almost totally lost.

The new inhabitants were not treated with much more kindness by Phylcon than the old ones had been; for, on their complaining of his tyrannical behavior, he resolved on a general massacre of the young men. Accordingly, when they were one day assembled in the gymnasium, or place of their public exercises, he ordered it to be set on fire; so that they all perished, either in the flames, or by the swords of his mercenaries, whom the tyrant had placed at all the avenues.

Though Julius Caesar was obliged to carry on a war for some time against the city, it seems not to have suffered much damage, except the burning of the library already mentioned. Before Caesar left Alexandria, in acknowledgment of the assistance he had received from the Jews, he confirmed all their privileges there, and even engraved his decree on a pillar of bract. This, however, did not prevent the massacre of 50,000 of them in this city about the year of Christ 67.

The city of Alexandria seems to have fallen into decay soon after this, and to have forfeited many of its ancient privileges, the for what offence is not known; but when Adrian visited Egypt, about the year 145, it was almost totally ruined. He repaired both the public and private buildings, not only restoring the inhabitants to their ancient privileges, but heaping new favours upon them; for which they returned him their solemn thanks, and conferred upon him what honours they could while he was present; but as soon as he was gone, they published the most bitter and virulent lampoons against him.

The jele and fatirical humour of the Alexandrians was highly disliked by Adrian, though he inflicted no punishment upon them for it; but when they lampooned Caracalla, he did not let them escape so easily. That tyrant, in the year 215, when he visited their city, having become the subject of their foolish satires, ordered a general massacre by his numerous troops, who were dispersed all over the city. The inhuman orders being given, all were murdered, without distinction of age or sex; so that in one night’s time the whole city was filled in blood, and every house was filled with carcasses. The monster who occasioned this had retired during the night to the temple of Serapis, to implore the protection of that deity; and, not yet satisfied with destruction, commanded the massacre to be continued all the next day; so that very few of the inhabitants remained. As if even this had not been sufficient, he stripped the city of all its ancient privileges; suppressed the academy; ordered all strangers who lived there to depart; and that the few who remained might not have the satisfaction of seeing one another, he cut off all communication of one street with another, by walls built for that purpose, and guarded by troops left there.

Notwithstanding this terrible disaster, Alexandria soon recovered its former splendor. Her大战 was murdered a short time after. It was long esteemed the first city in the world, next to Rome; and we may judge of its magnificence, and the multitude of people contained in it, from the account of Diodorus Siculus, who relates, that in his time (44 years before Christ) Alexandria had on its rolls 300,000 freemen. Towards the middle of the sixth century, Ammon Ibn el Aas, Omar’s general, took it by storm, after a siege
Alexandria of 14 months, and with the loss of 23,000 men. Heraclius, the emperor of Constantinople, did not send a single ship to its assistance. This prince affords an example very rare in history; he had displayed some vigour in the first year of his reign, and then suffered himself to be lull'd into idlenes and effeminacy. Awakened suddenly from his lethargy by the noise of the conquerors of Contra, that scourge of the east, he put himself at the head of his armies, distinguished himself as a great captain from his very first campaign, laid waste Persia for seven years, and returned to him capital covered with laurels: he then became a theologian on the throne, lost all his energy, and amused himself the rest of his life with disputing upon Monotheism, whilst the Arabs were robbing him of the finest provinces of his empire. Deaf to the cries of the unfortunate inhabitants of Alexandria, he had been too athe of the people of Jerusalem, who defended themselves for two years, he left them a sacrifice to the fortunate ascendency of the indefatigable Amrou. All their intrepid youth perished with their arms in their hands.

The victor, astonished at his conquest, wrote to the caliph, "I have taken the city of the west. It is of an immense extent. I cannot describe to you how many wonders it contains. There are 4000 palaces, 12,000 baths, 12,000 dealers in fresh oil, 12,000 gardeners, 40,000 Jews who pay tribute, 400 comedians," &c.

At this time according to the Arabian historians, Alexandria consisted of three cities, viz. Menna, or the port, which included Pharos, and the neighbouring parts; Alexandria, properly so called, where the modern Scanderia now stands; and Nektis, probably the Necropolis of Josephus and Strabo.

At that time John, surnamed the grammatian, a famous Peripatetic philosopher, living in the city, and in high favour with Amrou Ebn Al Aas the Saracen general begg'd of him the royal library. Amrou replied, that it was not in his power to grant such a requisit; but that he would write to the Khalif on that head; since without knowing his pleasure, he dared not to dispose of a single book. He accordingly wrote to Omar, who was then Khalif, acquainting him with the request of his friend: To which the ignorant tyrant replied, That if those books contain the same doctrine with the Koran, they could be of nought, for the Koran contained all necessary truths; but if they contained any thing contrary to that book, they ought not to be suffered: and therefore, whatever their contents were, he ordered them to be destroyed. Pursuant to this order, they were distributed among the public baths; where, for the space of six months, they served to supply the fires of those places of which there was an incredible number in Alexandria.

After the city was taken, Amrou thought proper to pursue the Greeks who had fled farther up the country; and therefore marched out of Alexandria, leaving but a very slender garrison in the place. The Greeks, who had before fled on board the ships, being apprised of this, returned on a sudden, surpriz'd the town, and put all the Arabs they found therein to the sword: but Amrou, receiving advice of what had happened, suddenly returned, and drove them out of it with great slaughter; after which the Greeks were frightened, that he had nothing farther to fear from them.—A few years after, however, Amrou being deprived of his government by the Khalif Othman, the Egyptians were so much displeased with his diminution that they inclined to a revolt; and Constantine the Greek emperor, having received intelligence of their dissatisfaction, began to meditate the reduction of Alexandria. For this purpose, he sent one Manuel, an eunuch, and his general, with a powerful army, to re-take that place; which, by the assistance of the Greeks in this city, who kept a secret correspondence with the imperial forces while at sea, and joined them as soon as they had made a descent, he effected, without any considerable effusion of Christian blood. The Khalif, now perceiving his mistake, immediately restored Amrou to his former dignity. This step was very agreeable to the natives; who having had experience of the military skill and bravery of this renowned general, and apprehending that they should be called to an account by the Greeks for their former perfidious conduct, had petitioned Othman to send him again into Egypt. Upon Amrou's arrival, therefore, at Alexandria, the Copts or natives, with the traitor Al-Mokawkas (who had formerly betrayed Amrou the forrers of Meid) at their head, not only joined him, but supplied him with all kinds of provisions, exciting him to attack the Greeks without delay. This he did; and, after a most obstinate dispute which lasted several days, drove them into the town, where, for some time, they defended themselves with great bravery, and repuls'd the utmost efforts of the besiegers. This so exasperated Amrou, that he swore, "If God enabled him to conquer the Greeks, he would throw down the walls of the city, and make it as easy of access as a bawdy-house, which lies open to every body." Nor did he fail to execute this menace; for having taken the town by storm, he quite dismantled it, entirely demolishing the walls and fortifications. The lives of the citizens, however, were spared, at least as far as lay in the general's power; but many of them were put to the sword by the soldiers on their first entrance. In one quarter particularly, Amrou found them butchering the Alexandrians with unrelenting barbarity; to which, however, by his reasonable interposition, he put a stop, and on that spot erected a mosque, which he called the "mosque of mercy."

From this time Alexandria never recovered its former splendor. It continued under the dominion of the Khalif's till the year 924, when it was taken by the Magrebians, two years after its great church had been destroyed by fire. This church was called by the Arabs Al Kasfara, or Caperna; and had formerly been a pagan temple, erected in honour of Saturn by the famous queen Cleopatra.

The city was soon after abandoned by the Magrebians; but in 928 they again made themselves masters of it: their fleet being afterwards defeated by that belonging to the Khalif, Abul Kafem, the Magrebian general retired from Alexandria, leaving there only a garrison of 300 men; of which Thosall, the Khalif's admiral, being apprised, he in a few days appeared before the town, and carried off the remainder of the inhabitants to an island in the Nile called Abukair. This was done, to prevent Abul Kafem from meeting with any entertainment at Alexandria, in case he should think proper to return. According to Eutychius, above 200,000...
A L E 

[ 392 ]

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Alexandria. 200,000 of the miserable inhabitants perished this year.

What contributed to raise Alexandria to such a prodigious height of splendor as it enjoyed for a long time, was its being the centre of commerce between the eastern and western parts of the world. It was with the view of becoming master of this lucrative trade, that Alexander built this city, after having extirpated the Tyrians, who formerly engrossed all the East-India traffic. Of the immense riches which that trade afforded, we may form an idea, from considering the Egyptians, especially the Alexandrians; and after the defeat of Zenobia, there was a single merchant of Alexandria who undertook to raise and pay an army out of the profits of his trade. The Greek emperors drew prodigious tributes from Egypt, and yet the caliphs found their subjects in good circumstances as to screw up their revenues to three hundred millions of crowns.

Though the revolutions which happened in the government of Egypt, after it fell into the hands of the Moors, and was frequently ravaged by different tribes, did not utterly extinguish Alexandria, yet it lost the excellence of its port, and the innumerable conveniences resulting from the East-India trade, to whomsoever were masters of Egypt, preferred Alexandria from total destruction, even when in the hands of the most barbarous nations. Thus, in the 13th century, when the barbarism introduced by the Goths, &c. began to wear off from the commerce, and they acquired a taste for the elegancies of life, the old mart of Alexandria began to revive; and the port, though far from recovering its former magnificence, grew once more famous by becoming the centre of commerce: but having fallen under the domination of the Turks, and the pillage round the Cape of Good Hope being discovered by the Portuguese in 1499, a fatal blow was given to the Alexandrian commerce, and the city has since fallen into decay.

At present the city of Alexandria is reckoned to have about 14,000 or 15,000 inhabitants; a strange colluvi of different nations, as well as from various parts of the Turkish empire. They are in general given to thieving and cheating; and (like their predecessors) seditions above all others, were they not kept in awe by the severity of their government. The British and French carry on a considerable commerce with them, and have each a consul residing here. Some Venetian ships also fail thither yearly, but with French colours, and under the protection of France. The subjects of those kingdoms which keep no consul here, are subject to a tax by the Grand Signior; but the Jews have found out the method of indemnifying themselves for this disadvantage; namely, by selling their commodities cheaper than other foreigners can afford. They are also favoured by the farmers of the revenue; who, knowing, that if they do not pay some private regard to them, the Jews have it their power to cause fewer merchandizes come into their port during the two years that their farm lasts.

The present city is a kind of peninsula situated between the two ports. That of the westward was called by the ancients the Portus Eunobius, now the Old Port, and is by far the best; Turkish vessels only are allowed to anchor there: the other, called the New Port, is for the Christians at the extremity of one of the arms of which stood the famous Pharos. The New Port, the only harbour for the Europeans, is clogged up with Alexandria sand, insomuch that in stormy weather ships are liable to bilge; and the bottom being also rocky, the cables from chafe and part; so that one vessel driving against a fagond, and that against a third, they are perhaps all lost. Of this there was a fatal instance 16 or 18 years ago, when 42 vessels were dashed to pieces on the mole in a gale of wind from the north-west, and numbers have been since lost there at different times. If it be asked, Why do they not repair the New Port? the answer is, That in Turkey they destroy every thing and repair nothing. The old harbour will be destroyed likewise, as the ballast of vessels has been continually thrown into it for the last 200 years. The spirit of the Turkish government is to ruin the labours of past ages, and destroy the hopes of future times, because the barbarity of ignorant despotsipem never considers to-morrow.

In time of war, Alexandria is of no importance; no fortification is to be seen; even the Farillon, with its lofty towers, cannot be deemed a great garrison. There is not a cannon fit for service, nor a gunner who knows how to point them. The 500 janizaries, who should form the garrison, reduced to half the number, know nothing but how to smoke a pipe. But Alexandria is a place of which the conquest would be of no value. A foreign power could not maintain itself there, as the country is without water. This must be brought from the Nile by the kalidj, or canal of 12 leagues, which conveys it thither every year at the time of the inundation. It fills the vaults or reservoirs dug under the ancient city, and this provision must serve till the next year. It is evident, therefore, that were a foreign power to take possession, the canal would be shut, and all supplies of water cut off. It is this canal alone which connects Alexandria with Egypt; for from its situation without the Delta, and the nature of the soil, it really belongs to the deserts of Africa. Its environs are sandy, flat, and sterile, without trees and without houses; where we meet with nothing but the plant which yields the kail, and a row of palm-trees which follows the course of the kalidj or canal.

The city is governed like others in the same kingdom. (See Egypt.) It has a small council of elders, part of which are Janizaries and Almifs; who are very haughty and insolent, not only to strangers, but to the mercantile and industrious part of the people, tho' ever so considerable and useful. The government is so remiss in favour of these wretches, that Mr Norden informs us, one of them did not hesitate to kill a farmer of the customs, for refusing to take lets of him than the duty imposed, and went off unpunished; it being a common salvo among them, that what is done cannot be undone.

The present condition of Alexandria is very deplorable, being now so far ruined, that the rubbish in many places overtops the houses. The famous tower of Pharos has long since been demolished, and a castle, called Farillon, built in its place. The caufway which joined the island to the continent is broken down, and its place supplied by a stone bridge of several arches.

Some parts of the old walls of the city are yet standing, and present us with a masonry-piece of ancient magnificence. They are flanked with large towers, about 200 paces distant from each other, with small ones in the middle.
Alexandria, middle. Below are magnificent censers, which may serve for galleries to walk in. In the lower part of the towers is a large square hall, whose roof is supported by thick columns of Thebaic stone. Above this are several rooms, over which there are platforms more than 20 paces square. The ancient reconverts, vaulted with so much art, which extend under the whole town, are almost entire at the end of 2000 years.

Of Caesar’s palace there remain only a few porphyry pillars, and the front, which is almost entire, and looks very beautiful. The palace of Cleopatra was built upon the walls facing the port, having a gallery on the outside, supported by several fine columns. Not far from this palace are two obelisks vulgarly called Cleopatra’s Needles. They are of Thebaic stone, and covered with hieroglyphics. One is overturned, broken, and lying under the sand; the other is on its pedestal. These two obelisks, each of them of a single stone, are about 60 feet high, by seven feet square at the base. Towards the gate of Rosetta, are five columns of marble on the place formerly occupied by the porticos of the Gymnasion. The rest of the colonnade, the design of which was discoverable 1600 years ago by Mallet, has since been destroyed by the barbarism of the Turks.

But what most engages the attention of travellers is the Pillar of Pompey, as it is commonly called, situated at a quarter of a league from the southern gate. It is composed of red granite. The capital is Corinthian, with palm leaves, and not indented. It is nine feet high. The shaft and the upper member of the base are of one piece of 90 feet long, and 0 in diameter. The base is a square of about 15 feet on each side. This block of marble, 60 feet in circumference, rests on two layers of stone bound together with lead; which, however, has not prevented the Arabs from forcing our several of them, to search for an imaginary treasure. The whole column is 144 feet high. It is perfectly well polished, and only a little flivered on the eastern side. Nothing can equal the majesty of this monument; from a distance, it overtops the town, and serves as a signal for vessels. Approaching it nearer, it produces an affonishment mixed with awe. One can never be tired with admiring the beauty of the capital, the length of the shaft, nor the extraordinary simplicity of the pedestal. This last has been somewhat damaged by the instruments of travellers, who are curious to posele a relic of this antiquity; and one of the volutes of the column was immediately brought down about 12 years ago, by a prank of some English captains, which is thus related by Mr. Irwin.

These jolly fons of Neptune had been pulling about the canoe on board one of the ships in the harbour, until a strange freak entered into one of their brains. The eccentricity of the thought occasioned it immediately to be adopted; and its apparent impossibility was but a spur for the putting it into execution. The boat was ordered; and with proper implements for the attempt, the seers exploring heroes pined away, to drink a bowl of punch on the top of Pompey’s pillar! At the spot they arrived; and many contrivances were proposed to accomplish the desired point. But their labour was vain; and they began to despair of success, when the genius who struck out the frolic happily fig-
ALEXANDRIA (anc. geog.), a city of Arachosia, called also Alexandria, on the river Arachosus (Stephanus, Iliodorus Characenus).—Another Alexandria in Geæroia, built by Leonatus, by order of Alexander (Pliny).—A third Alexandria in Aria, situated at the lake Arias (Poolemy), but, according to Pline, built by Alexander on the river Arias.—A fourth in the Bactriana (Pliny).—A fifth Alexandria, an inland town of Carmania (Pliny, Ptolemy, Ammian).—A sixth Alexandria, or Alexandria, in the Sogdiana (Iliodorus Characenus).—A seventh in India, at the confines of the Accanes and Indus (Arrian).—An eighth called also Alexandretta, near the finus Ilicus, on the confines of Syria and Cilicia, now Scanderbon (see Alexandria), the port-town to Aleppo. —A ninth Alexandria of Margiana, which being demolished by the barbarians, was rebuilt by Antiochus the son of Seleucus, and called Alexandria Julianopolis (Pliny, Arrian).—A twelfth Alexandria in Baœria, called Troas and Antigonia (Pliny).—A thirteenth on the Iaxartes, the boundary of Alexander's victories towards Scythia, and the left that he built on that side.

ALEXANDRIAN, in a particular sense, is applied to all those who professed or taught the sciences in the school of Alexandria. In this sense, Clesmus is denominated Alexandrinus, though born at Athens. The name was, however, claimed by Apion, who was born at Oasis, and Aretarchus, by birth a Samothracian. The chief Alexandrian philosophers were, Ameinocles, Plotinus,
ALEXANDRIA, the name given by the Moors to a fort of vermicelli, which they make of flour and water and are very fond of in their entertainments.

ALEF, in old Latin, a letter of the alphabet, which was represented by a triangle with a point downwards.

ALEXANDRIA, or Alexandria, in poetry, a kind of verse consisting of twelve, or of twelve and thirteen syllables alternately: so called from a poem on the life of Alexander, written in this kind of verse by some French poet. Alexandria is peculiar to modern poetry, and seem well adapted to epic poems. They are sometimes used by most nations of Europe; but chiefly in the French, whose tragedies are generally composed of Alexandrines.

ALEXICACUS, something that preserves the body from harm or mischief. The word amounts to the same as alexiterial.

ALEXIPHARMICS, in medicine, are properly remedies for expelling or preventing the ill effects of poison, but some of the moderns having imagined, that the animal spirits, in acute信息化, were affected by a malignant poison, the term has been understood to mean medicines adapted to expel this poison by the cutaneous pores, in the form of sweat. In this sense, alexipharmics are the same as sudorifics.

ALEXIS, a Piedmontese. There is a book of "Secrets," which for a long time has gone under his name. It was printed at Basl 1576, in 8vo, and translated from Italian into Latin by Wecker; it has also been translated into French, and printed several times with additions. There is a preface to the piece, wherein Alexis informs us, that he was born of a noble family; that he had from his most early years applied himself to study; that he learned the Greek, the Latin, the Hebrew, the Chaldee, the Arabian, and several other languages; that having an extreme curiosity to be acquainted with the secrets of nature, he had collected as much as he could during his travels for 57 years; that he piqued himself upon not communicating his secrets to any person; but that when he was 82 years of age, having seen a poor man who had died of a sickness which might have been cured had he communicated his secret to the surgeon who took care of him, he was touched with such a remembrance of confidence, that he lived almost like a hermit; and it was in this solitude that he ranged his secrets in such an order as to make them fit to be published. The hawksers generally carry them, with other books, to the country fairs. These, however, contain only the select remedies of Seignor Alexis of Piedmont; the entire collection would make too large a volume for them.

ALEXITERIAL, among physicians, a term of much the same import with alexipharmic; though some times used in a synonymous sense with amulet.

ALEYNE, (Charles), an English poet in the reign of Charles I. In 1631, he published two poems on the famous victories of Cressey and Poictiers. He succeeded his father as clerk of the ordnance, and was commissary general of the artillery to the king at the battle of Edgehill. The next piece he wrote was a poem in honour of Henry VII, and the victory that gained him the crown of England. In 1636, the year before he died, he translated the history of Eurialius and Lucretia, from the Latin epistles of Enneas Sylvius.

ALFANDIGA, the name of the customhouse at Lisbon.

ALFAQUES, among the Moors, the name generally used for their clergy, or those who teach the Mahometan religion; in opposition to the Morabites, who answer to monks among Christians.

ALFATERNA (anc. geogr.), the last town of Campania, beyond Vesuvius (Diodorus); the name with Nocera, which fce. The inhabitants Alfaferi, Piny.

ALFDOUGH, a name given by the Moors to a market town in Lincolnshire, with a market on Tuesdays for provisions and corn; and two fairs, on Whit-Tuesday, and November 8, for cattle and sheep. It is seated on a small brook that runs through the town, and is a compact place. A small spring was discovered here in 1670, from the pigeons which flew thither in great numbers to drink the water; those birds being known to be fond of salt. It contains a purging salt, together with a portion of sleet. It is strongly purgative. It is recommended as cooling, cleansing, and attenuating. As a good remedy in the scurvy, jaundice, and other glandular obstructions. It also promotes urine and sweat, and therefore is good in gravelly and other disorders of the kidneys and bladder; and in complaints arising from obstructed perspiration. Alford is six miles from the sea, and 20 N. of Boston. E. Long. 0. 13. N. Lat. 53. 30.
ALFRED, or Elfred, the Great, king of England, was the fifth and youngest son of Æthelwulf, king of the West Saxons, and was born at Wantage in Berkshire in 849. He distinguished himself, during the reign of his brother Ethelred, in several engagements against the Danes; and upon his death succeeded to the crown, in the year 871, and the 22d of his age. At his ascending the throne he found himself involved in a dangerous war with the Danes, and placed in such circumstances of distress as called for the greatest valour, resolution, and all the other virtues with which he was adorned. The Danes had already penetrated into the heart of his kingdom; and before he had been a month on the throne, he was obliged to take the field against these formidable enemies. After many battles gained on both sides, he was at length reduced to the greatest distress, and was entirely abandoned by his subjects. In this situation, Alfred, conceiving himself no longer a king, laid aside all marks of royalty, and took shelter in the house of one who kept his cattle. He retired afterwards to the Isle of Athelney, in Somersetshire, where he built a fort for the security of himself, his family, and a few faithful tenants who repaired thither to him. When he had been about a year in this retreat, having been informed that some of his subjects had routed a great army of the Danes, killed their chiefs, and taken their magical standard, he filled his letters, giving notice where he was, and inviting his nobility to come and confound with him. Before they came to a final determination, Alfred, putting on the image of a harper, went to the enemy's camp, where without suspicion, he was every where admitted, and had the honour to play before their princes. Having thereby acquired an exact knowledge of their situation, he returned in great secrecy to his nobility, whom he ordered to their respective homes, there to draw together each man as great a force as he could; and upon a day appointed there was to be a general rendezvous at the great wood, called Chipstead, in Wiltshire. This affair was transacted so secretly and expeditiously, that, in a little time, the king, at the head of an army, approached the Danes, before they had the least intelligence of his design. Alfred, taking advantage of the surprise and terror they were in, fell upon them, and totally defeat-ed them at Athelstane, now Eddington. Those who escaped fled to a neighbouring castle, where they were soon besieged, and obliged to surrender at discretion. Alfred granted them better terms than they could expect. He agreed to give up the whole kingdom of the Earl-Angles to such as would embrace the Christian religion, on condition they would oblige the rest of their countrymen to quit the island, and, as much as it was in their power, prevent the landing of any more foreigners. For the performance thereof he took hostages; and when, in pursuance of the treaty, Guthrum the Danish captain came, with thirty of his chief officers, to be baptized, Alfred answered for him at the font, and gave him the name of Æthelfrith; and certain laws were drawn up between the king and Guthrum for the regulation and government of the Danes settled in England. In 884, a fresh number of Danes landed in Kent, and laid siege to Rochester; but the king coming to the relief of that city, they were obliged to abandon their design. Alfred had now great success; which was chiefly owing to his fleet, an advantage of his own creating. Having secured the seas, he fortified the rest of the kingdom, with castles and walled towns; and he beleaguered and recovered from the Danes the city of London, which he resolved to repair, and keep as a frontier (a).

After some years respite, Alfred was again called into the field: for a body of Danes, being wonted in the west of France, came with a fleet of 200 vessels on the coast of Kent; and having landed, fixed themselves at Apple-tree; shortly after, another, fleet of 50 vessels coming up the Thames, the men landed, and built a fort at Middleton. Before Alfred marched against the enemy, he obliged the Danes, settled in Northumberland and Essex, to give him hostages for their good behaviour. He then moved towards the invaders, and pitched his camp between their armies, to prevent their junction. A great body, however, moved off to Essex; and crossing the river, came to Farnham in Surry, where they were defeated by the king's forces. Mean-while the Danes settled in Northumberland, in breach of treaty, and notwithstanding the hostages given, equipped two fleets; and, after plundering the northern and southern coasts, failed to Exeter, and besieged it. The king, as soon as he received intelligence, marched against them; but before he reached Exeter, they had got possession of it. He kept, them, however, blockaded upon all sides; and reduced them at last to such extremities, that they were obliged to eat their horses, and were even ready to devour each other. Being at length rendered desperate, they made a general rally on the besiegers;

(a) "This (says Sir John Spelman) was a banner with the image of a raven magically wrought by the three sisters of Hinguar and Hobba, on purpose for their expedition, in revenge of their father Lodmarch's murder, made, they say, almost in an instant, being by them at once begun and finished in an antiochite, and believed by the Danes to have carried great fatality with it, for which it was highly esteemed by them. It is pretended, that being carried in battle, towards an good success it would always seem to clap its wings, and make it if it would fly; but towards the approach of mischief, it would hang down and not move." Life of Alfred, p. 61.

The Danes had poisined themselves of London in the time of his father; and had held it till now as a convenient place for them to land at, and fortify themselves in; neither was it taken from them but by a close siege. However, when it came into the king's hands, it was in a miserable condition, scarce habitable, and all its fortifications ruined. The king, moved by the importance of the place, and the desire of strengthening his frontier against the Danes, restored it to its ancient splendor. And observing, that, through the confusions of the times, many, both Saxons and Danes, lived in a loose disordered manner, without owning any government, he offered them now a comfortable establishment, if they would submit and become his subjects. This proposition was better received than he expected; for multitudes growing weary of a vagabond kind of life, joyfully accepted such an offer. Chron. Sax. p. 89. .
The king's contrivance is thought to have produced the meadow between Hertford and Bow; for at Hertford was the Danish fort, and from thence they made frequent excursions on the inhabitants of London. Authors are not agreed as to the method the king purposed in laying dry the Danish ships: Dugdale supposes that he did it by straightening the channel; but Henry of Huntington alleges, that he cut several canals, which exhausted its water.
net-College library, at Cambridge. 3 *Instituta gueudem, lib. 1, Certain Institutes, in one book. This is mentioned by Pitts, and seems to be the second counterpart with Guthrum. 4. Contra judices iniquos, lib. 1. An Inveigle against Unjust Judges, in one book. 5. *Alta Magnificaturn fioron*, lib. 1. Acts of his Magnificates, in one book. This is supposed to be the book of judgments mentioned by Horne; and was, in all probability, a kind of reports, intended for the use of succeeding ages. 6. Regnum fortune variae, lib. 1. The various Fortunes of Kings, in one book. 7. Dier- ta feplentum, lib. 1. The Sayings of Wise Men, in one book. 8. Parabola et folus, lib. 1. Parables and pleasant sayings, in one book. 9. *Collectiones chroni- corum. Collections of Chronicles. 10. Epitome ad Wulf- figum Episcopum*, lib. 1. Epistles to Bishop Wulfigs, in one book. 11. *Manuale meditationum. A Manu- al of Meditations.* Besides these original works, he translated many authors from the Latin, &c. into the Saxon language, viz. 1. Bede's History of England. 2. Paulinus Orosius's History of the Pagans. 3. St Gregory's Fastoral, &c. The first of these, with his pauses, was published at London in 1644. The second, with his laws, were printed at Cambridge, 1644. His laws are likewise inferred in Spelman's Councils. 4. *Boetius de Confola- tione*, lib. V. Boetius's Consolations of Philosophy, in five books. Dr Plot tells us, king Alfred translated it at Woodstock, as he found in a MS. in the Cotton Library. 5. *Epopea Fabulae, Epope Fables*: he is said to have translated from the Greek both into Latin and Saxon. 6. *Pfalterium Davidicum, lib. I. David's Psalter, in one book. This was the last work the King attempted, death surprizing him before he had finished of May, 1764; and ordered his own mausoleum, with this inscription to be fixed upon it: *Hic jacet* a man whose root, leaf, and limbs are alone. Under this description are comprehended all the sea-weeds, and some other aquatic plants. In the sexual system, they constitute the 3rd order of the 24th class Cryptogamia; in Tournefort, the second genus of the second section, Marineae, aut fluviatiles, of the 17th class Alpinoe volgo habitae; and the 57th order in Linnaeus's Fragments of a Natural Method. The discoveries made in this part of the vegetable kingdom are uncertain and imperfect; and the attempts, in particular, to arrange flags by the parts of the fruitification, have not been attended with great success. Dillenius has arranged this order of plants from their general habit and structure; Michelius from the parts of fruitification.—Each has considerable merit.

**ALGAROIA**, a small sea-port town in the island of Corica, fortified with walls and bastions. It was almost destroyed by the mal-content in 1731, but has since been repaired. E. Long. 9. 45. N. lat. 42. 20.  

**ALGAROT**, in chemistry, an Arabic term for an emetic powder, prepared from regulus of antimony, dissolved in acids, and separated by repeated lotions in warm water.

**ALGAROTTI (Cont) a celebrated Italian, was born at Padua; but the year is not mentioned. Led by curiosity, as well as a desire of improvement, he travelled early into foreign countries; and was very young when he arrived in France in 1736. Here he composed his *Newtonian Philosophy for the Ladies,* as Fontenelle had done his Cartesian Astronomy, in the work entitled, *The plurality of worlds.* He was noticed by the king of Prussia, who gave him marks of the esteem he had for him. He died at Pisa the 23d of May, 1764; and ordered his own mausoleum, with this inscription to be fixed upon it: *Hic jacet* Alga- rotti, *rostis, fed non omnis.* He is allowed to have been a very great connoisseur in painting, sculpture, and architec- ture. He contributed much to the reformation of the Italian opera. His works which are numerous, and upon a variety of subjects, abound with vivacity, elegance, and wit: a collection of them has lately been made, and printed at Leghorn.

**ALGARVA**, a province in the kingdom of Por-ugal, 67 miles in length and 20 in breadth: bounded on the W. and S. by the sea, on the E. by the river Guadiana, and on the N. by Alentej. It is very fertile in figs, almonds, dates, olives, and excellent wines; besides, the fishery brings in large sums. The capital town is Pharo. It contains four cities, 12 towns, 67 parishes, and 61,000 inhabitants.

**ALGEBRA.** A method of computation, wherein signs and symbols, commonly the letters of the alphabet, are used to represent numbers, or any other quantities.

This science, properly speaking, is no other than a kind of shorthand, or ready way of writing down a chain of mathematical reasoning on any subject whatsoever; so that it is applicable to arithmetic, geometry, astronomy, menedication of all kinds of solids, &c. and the great advantages derived from it appear manifestly to arise from the conciseness and perspicuity with which every proposition on mathematical subjects can be written down in algebraic characters, greatly superior to the tedious circumlocutions which would be necessary were the reasoning to be written in words at length.

With regard to the etymology of the word *algebra*, it is much controverted by the critics. Menage derives it from the Arabic *algobaras,* which signifies the restitution of any thing broken; supposing that the principal part of *algebra* is the consideration of broken numbers. Others rather borrow it from the Spanish, *algebris,* a person who replaces dislocated bones; ad-
that algebra has nothing to do with fraction. Some, with M. d'Herbelot, are of opinion, that algebra takes its name from Geber, a celebrated philosopher, chemist, and mathematician, whom the Arabs call Giaber, and who is supposed to have been the inventor. Others from geber, a kind of parchment made of the skin of a camel, whereon Ali and Grifer Sakak wrote, in mystic characters, the fable of Mahometanism, and the grand events that were to happen till the end of the world. But others, with more probability, derive it from geber: a word whence, by prefixing the article al, we have formed algebra; which is pure Arabic, and properly signifies the reduction of fractions to a whole number. However, the Arabs, it is observed, never used the word algebra alone, to express what we mean by it; but always added to it the word macabelah, which signifies opposition and comparison: thus algebra-macabelah, is what we properly call algebra.

Some authors define algebra, The art of solving mathematical problems; but this is rather the idea of analysis, or the analytic art. The Arabs call it, The art of reflection and comparison; or, The art of resolution and equation. Lucas de Burgo, the first European who wrote of algebra, calls it, Regula rei et confit: that is, the rule of the root and its square; the root with them being called rei, and the square confit. Others call it Species Arithmetic; and some Universal Arithmetic.

It is highly probable that the Indians or Arabians first invented this noble art: for it may be reasonably supposed, that the ancient Greeks were ignorant of it; because Pappus, in his mathematical collections, where he enumerates their analysis, makes no mention of any thing like it; and, besides, speaks of a local problem, begun by Euclid, and continued by Apollonius, which none of them could fully resolve; which doubtless they might easily have done, had they known any thing of algebra.

Diaphantus was the first Greek writer of algebra; who published 13 books about the year 800, though only six of them were translated into Latin, by Xylander, in 1575; and afterwards, viz. anno 1721, in Greek and Latin, by M. Buchet and Ferret, with additions of their own. This algebra of Diophantus only extends to the solution of arithmetical indeterminate problems.

Before this translation of Diophantus came out, Lucas Paccilius, or Lucas de Burgo, a Minorite friar, published at Venice, in the year 1694, an Italian treatise of algebra. This author makes mention of Leonardus Piusius, and some others, of whom he had learned the art; but we have none of their writings. He adds, that algebra came originally from the Arabs, and never mentions Diophantus; which makes it probable that that author was not then known in Europe. His algebra goes no farther than simple and quadratic equations.

After Paccilius appeared Silfius, a good author; but neither did he advance any farther.

After him came Scipio Ferrarius, Cardan, Tartaglia, and some others, who reached as far as the solution of some cubic equations. Bombelli followed these, and went a little farther. At last came Nanneus, Ramus, Schoner, Salignac, Clavius, &c. who all of them took different courses, but none of them went beyond quadratics.

In 1590, Vieta introduced what he called his Species Arithmetic, which consists in denoting the quantities, both known and unknown, by symbols or letters. He also introduced an ingenious method of extracting the roots of equations, by approximations; since greatly improved and facilitated by Ralphson, Halley, Maclaurin, Simpson, and others.

Vieeta was followed by Oughtred, who, in his Clavis Mathematica, printed in 1621, improved Vieta's method, and invented several compendious characters, to show the sums, differences, rectangles, squares, cubes, &c.

Harriot, another Englishman, contemporary with Oughtred, left several treatises at his death; and among the rest, an Analysis, or Algebra, which was printed in 1631, where Vieta's method is brought into a still more commodious form, and is much esteemed to this day.

In 1657, Des Cartes published his geometry, where he made use of the literal calculus and the algebraic rules of Harriot; and as Oughtred in his Clavis, and Marin. Ghetaldus in his books of mathematical composition and resolution published in 1650, applied Vieta's arithmetic to elementary geometry, and gave the construction of simple and quadratic equations; so Des Cartes applied Harriot's method to the higher geometry, explaining the nature of curves by equations, and adding the contractions of cubic, biquadratic, and other higher equations.

Des Cartes's rule for constructing cubic and biquadratic equations, was farther improved by Thomas Baker, in his Clavis Geometriae Catholica, published in 1684; and the foundation of such contructions, with the application of algebra to the quadratures of curves, questions de maximis et minimis, the centrobaric method of Guldinus, &c. was given by R. Snellius, in 1668; as also by Fermat in his Opera Mathematica, Roberval in the Mem. de Math. et de Philos., and Barrow in his Lectiones, 17-8, algebra was applied to the laws of chance and gaming, by R. de Montmort; and since by de Moivre and James Bernoulli.

The elements of the art were compiled and published by Merian in 1671; and afterwards, inferius, &c. were applied to the solution of algebra to geometry; which defect is supplied by Guinée in a French treatise expressly on the subject published in 1704, and by Oughtred, in his Clavis Mathematica, published in 1665, which contains a variety of examples: the whole substance of Diophantus is here delivered, and many things added concerning mathematical composition and resolution from Ghetaldus. The like has been since done by Puffert in 1654, and by Oyama in 1703; but these authors omit the application of algebra to geometry; which defect is supplied by Guinée in a French treatise expressly on the subject published in 1704, and by Oughtred, in his Clavis Mathematica, published in 1665.

The rules of algebra are also comprehended by Sir Isaac Newton, in his Arithmetica Universalis, first published in 1707, which abounds in useful examples, and contains several rules and methods invented by the author.

Algebra has also been applied to the consideration and calculation of infinites; from whence a new and extensive branch of knowledge has arisen, called the Doctrine of Fluxions; or Analysis of Infinites, or the Calculus Differentials.
A QUANTITY which can be measured, and is the object of mathematics, is of two kinds, Number and Extension. The former is treated of in Arithmetic; the latter in Geometry.

Numbers are ranged in a scale, by the continued repetition of some one number, which is called the Root; and, in consequence of this order, they are conveniently expressed in words, and denoted by characters. The operations of arithmetic are easily derived from the established method of notation, and the most simple reasonings concerning the relations of magnitude.

Investigations by the common arithmetic are greatly limited, from the want of characters to express the quantities that are unknown, and their different relations to one another, and to such as are known. Hence letters and other convenient symbols have been introduced to supply this defect; and thus gradually has arisen the science of Algebra, properly called Universal Arithmetic.

In the common arithmetic too, the given numbers disappear in the course of the operation, so that general rules can seldom be derived from it; but, in algebra, the known quantities, as well as the unknown, may be expressed by letters, which, through the whole operation, retain their original form; and hence may be deduced, not only general canons for like cases, but the dependence of the several quantities concerned, and likewise the determination of a problem, without exhibiting which, it is not completely resolved. This general manner of expressing quantities also, and the general reasonings concerning their connections, which may be founded on it, have rendered this science not less useful in the demonstration of theorems than in the solution of problems.

If geometrical quantities be supposed to be divided into equal parts, their relations, in respect of magnitude, or their proportions, may be expressed by numbers; one of these equal parts being denoted by the unit. Arithmetic, however, is used in expressing only the conclusions of geometrical propositions; and it is by algebra that the bounds and application of geometry have been of late so far extended.

The proper objects of mathematical science are number and extension; but mathematical inquiries may be intituted also concerning any physical quantities that are capable of being measured or expressed by numbers and extended magnitudes: And, as the application of algebra may be equally universal, it has been called The science of quantity in general.

DEFINITIONS.

1. QUANTITIES which are known are generally represented by the first letters of the alphabet, as $a$, $b$, $c$, &c. and such as are unknown by the last letters, as $x$, $y$, $z$, &c.

2. The sign $+$ (plus) denotes, that the quantity before which it is placed is to be added. Thus $a+b$ denotes the sum of $a$ and $b$; $x+y$ denotes the sum of $x$ and $y$, or $8$. When no sign is expressed, $+$ is understood.

3. The sign $-$ (minus) denotes, that the quantity before which it is placed is to be subtracted. Thus $a-b$ denotes the excess of $a$ above $b$; $6-2$ is the excess of $6$ above $2$, or $4$. Note. These characters $+$ and $-$, from their extensive use in algebra, are called the signs; and the one is said to be opposite or contrary to the other.

4. Quantities which have the sign $+$ prefixed to them are called positive or affirmative; and such as have the sign $-$ prefixed to them are called negative.

5. Quantities which have the same sign, either $+$ or $-$, are also said to have like signs, and those which have different signs are said to have unlike signs. Thus $+a, +b$, have like signs, and $+a, -c$, are said to have unlike signs.

6. The juxtaposition of letters as in the same word, expresses the product of the quantities denoted by those letters. Thus $ab$ expresses the product of $a$ and $b$; $bc$ expresses the continued product of $b, c$, and $a$. The sign $+$ also expresses the product of any two quantities between which it is placed.

7. A number prefixed to a letter is called a numerable coefficient, and expresses the product of the quantity by that number, or how often the quantity denoted by the letter is to be taken. When no number is prefixed, unit is understood.

8. The quotient of two quantities is denoted by placing the dividend above a small line and the divisor below it. Thus $\frac{18}{3}$ is the quotient of $18$ divided by $3$, or $6$.

9. $\frac{a}{b}$ is the quotient of $a$ divided by $b$. This expression of a quotient is also called a fraction.

10. A quantity is said to be simple, which consists of one part or Term; as $a+a$, $-abc$; and a quantity is said to be compound, when it consists of more than one term connected by the signs $+$ or $-$. Thus $a+b$, $a-b+c$, are compound quantities. If there are two terms, it is called a binomial; if three, a trinomial, &c.

11. Simple quantities, or the terms of compound quantities, are said to be like, which consist of the same letter or letters, equally repeated. Thus $+ab$, $-5ab$, are like quantities; but $+ab$, and $+a$, are unlike.

12. The equality of two quantities is expressed, by placing the sign $=$ between them. Thus $x+y=z$, means that the sum of $x$ and $y$ is equal to the excess of $y$ above $z$.

When quantities are considered abstractly, then $+$ and $-$ denote addition and subtraction only, according to Def. 2. and 3. and the terms positive and negative express the same ideas. In that case, a negative quantity by itself is unintelligible. The sign $-$ also is unnecessary before simple quantities, or before the leading term of a compound quantity which is not negative; though, when such a quantity or term is to be added to another, $+$ must be placed before it, to express that addition; and hence in Def. 2. it is said, that $+$ is understood when no sign is expressed.
terms in the quantity to be added may be united, so as to render the expression in the sum more simple.

**PROB. II. To Subtract Quantities.**

General Rule. Change the signs of the quantity to be subtracted into the contrary signs, and then add it; so changed, to the quantity from which it was to be subtracted (by Prob. I.); and the sum arising by this addition is the remainder.

Examp. From $4a$ Subtract $3a$ $3ab-4mb$

Rem. $+2a$

From $5a-7b+9c+3$

Subt. $2a-4b+9c-d$

Rem. $3a-3b+8+d$

When a positive quantity is to be subtracted, the rule is obvious from Def. 3: In order to how it, when the negative part of a quantity is to be subtracted, let $e-d$ be subtracted from $a$, the remainder, according to the rule, is $a-e-d$. For if $e$ is subtracted from $a$, the remainder is $a-e$ (by Def. 3.); but this is too small, because $e$ is subtracted instead of $e-d$, which is less than it by $d$; the remainder therefore is too small by $d$; and $d$ being added, it is $a-e+d$; according to the rule.

Otherwise If the quantity $d$ is to be added to these two quantities $a$ and $e-d$, the difference will continue the same; that is, the excess of $a$ above $e-d$ is equal to the excess of $a+d$ above $e-d+d$; that is, to the excess of $a+d$ above $e$, which plainly is $a+d-e$, and is therefore the remainder required.

**PROB. III. To multiply Quantities.**

General Rule for the Signs. When the signs of the two terms to be multiplied are like, the sign of the product is +; but, when the signs are unlike, the sign of the product is -.

**Cafe 1.** To multiply two terms.

Rule. Find the sign of the product by the general rule; after it place the product of the numerical coefficients, and then set down all the letters one after another, as in one word.

| Mult. $+a$ | $+5b$ | $-5ax$ |
| By $+b$ | $-3e$ | $-7ab$ |
| $+ab$ | $-15bc$ | $+35abx$ |

The reason of this rule is derived from Def. 6, and from the nature of multiplication, which is a repeated addition of one of the quantities to be multiplied as often as there are units in the other. Hence also the letters in two terms multiplied together may be placed in any order, and therefore the order of the alphabet is generally preferred.

**Cafe 2.** To multiply compound quantities.

Rule. Multiply every term of the multiplicand by all the terms of the multiplier, one after another, according to the preceding rule, and collect all the products into one sum; that sum is the product required.

Examp.
The reason of that rule will appear by proving it, as applied to the last mentioned example of \( a-b \) multiplied by \( c-d \), in which every case of it occurs.

Since multiplication is a repeated addition of the multiplicand as often as there are units in the multiplier, hence, if \( a-b \) is to be multiplied by \( c-d \), \( a-b \) must be added to itself as often as there are units in \( c-d \), and the product therefore must be \( ca-cb-ad+db \) (Prop. I).

But this product is too great; for \( a-b \) is to be multiplied, not by \( c-d \), but by \( c-d \) only, which is the excess of \( a \) above \( b \) times \( c-d \) therefore, or \( ca-cb-ad+db \), has been taken too much; hence this quantity must be subtracted from the former part of the product, and the remainder, which (by Prop. II.) is \( ca-cb-ad+db \), will be the true product required.

Def. 13. The products arising from the continual multiplication of the same quantity are called the powers of that quantity, which is the root. Thus, \( aa, aaa, aaaa, \&c. \) are powers of the root \( a \).

14. These powers are expressed, by placing above the root, the right hand, a figure, denoting how often the root is repeated. This figure is called an index, or exponent, and from it the power is denominated. Thus,

\[
\begin{align*}
\text{Power of the root} & = a^n, \\
\text{where} & = \text{index, or exponent}.
\end{align*}
\]

The 2d and 3d powers are generally called the square and cube; and the 4th, 5th and 6th, are also sometimes respectively called the biquadrate, sest Hibatic, and subcubes.

Cor. Powers of the same root are multiplied by adding their exponents, Thus, \( a^1 \times a^2 = a^3 \), or \( aaa \times a = aaaa \), \( b^2 \times b^2 = b^4 \).

Scholium.

Sometimes it is convenient to express the multiplication of quantities, by letting down with the sign \( \times \) between them, without performing the operation according to the preceding rules; thus \( a \times b \) is written instead of \( a^1 \times b^1 \), and \( a-b \times c-d \) expresses the product of \( a-b \), multiplied by \( c-d \).

Def. 15. A vinculum is a line drawn over any number of terms of a compound quantity, to denote those which are understood to be affected by the particular sign connected with it.

Thus, in the last example, it shows that the terms \( +a \) and \( -b \), and also \( c \) and \( -d \) are all affected by the sign \( (\times) \). Without the vinculum, the expression \( a-b \times c-d \) would mean the excess of \( a \) above \( b \) and \( c \); and \( a-b \times c-d \) would mean the excess of the product of \( a-b \) by \( c-d \). Thus also \( a+b \) expresses the second power of \( a+b \), or the product of that quantity multiplied by itself; whereas \( a+b \) would express only the sum of \( a \) and \( b \); and so of others.

By some writers a parentheses ( ) is used as a vinculum, and \( a+b \) is the same thing as \( (a+b) \).
A L G E B R A.

Part I.

403

Rule 1. The terms of the dividend are to be ranged according to the powers of some one of its letters; and those of the divisor, according to the powers of the same letter.

Thus, if \( a^2 + 2ab + b^2 \) is the dividend, and \( a + b \) the divisor, they are ranged according to the powers of \( a \).

2. The first term of the dividend is to be divided by the first term of the divisor (observing the general rule of the signs); and this quotient being set down as a part of the quotient wanted, is to be multiplied by the whole divisor, and the product subtracted from the dividend. If nothing remain, the division is finished; the remainder, when there is any, is a new dividend.

Thus, in the preceding example, \( a^2 \) divided by \( a \), gives \( a \), which is the first part of the quotient wanted; and the product of this part by the whole divisor \( a + b \), viz. \( a^2 + ab \) being subtracted from the given dividend, there remains in this example \( ab + b^2 \).

3. Divide the first term of this new dividend by the first term of the divisor as before, and join the quotient to the part already found, with its proper sign: then multiply the whole divisor by this part of the quotient, and subtract the product from the new dividend; and thus the operation is to be continued till no remainder is left, or till it appear that there will always be a remainder.

Thus, in the preceding example, \( 4ab \), the first term of the new dividend divided by \( a \), gives \( b \); the product of which, multiplied by \( a + b \), being subtracted from \( ab + b^2 \), nothing remains, and \( a + b \) is the true quotient. The entire operation is as follows.

\[
\begin{align*}
  \frac{a^2 + 2ab + b^2}{a + b} &= a + ab + b^2, \\
  a + b &= a + b, \\
  ab + b^2 &= ab + b^2, \\
  &\quad \vdots \quad * \quad * \\
  3a^2 - b^2 &= 3a^2 - 12a^2 + 4a^3 + 3ab - 2b^3, \\
  &\quad \vdots \quad \vdots \quad \vdots \\
  &\quad \vdots \quad 1 - a = 1 + a + a^2 + a^3, & \text{&c.} \\
  1 - a &= 1 - a. \\
\end{align*}
\]

It often happens, as in the last example, that there is still a remainder from which the operation may be continued without end. This expression of a quotient is called an infinite series; the nature of which shall be considered afterwards. By comparing a few of the first terms, the law of the series may be discovered, by which, without any more division, it may be continued to any number of terms wanted.

Of the General Rule.

The reason of the different parts of this rule is evident; for, in the course of the operation, all the terms of the quotient obtained by it are multiplied by all the terms of the divisor, and the products are successively subtracted from the dividend till nothing remain: that, therefore, from the nature of division, must be the true quotient.

Note. The sign \(-\) is sometimes used to express the quotient of two quantities between which it is placed; Thus, \( a^2 + x^2 \div a + x \), expresses the quotient of \( a^2 + x^2 \) divided by \( a + x \).

§ 2. Of Fractions.

Definitions.

1. When a quotient is expressed by a fraction, the dividend above the line is called the numerator; and the divisor below it is called the denominator.

2. If the numerator is less than the denominator, it is called a proper fraction.

3. If the numerator is not less than the denominator, it is called an improper fraction.

4. If one part of a quantity is an integer, and the other a fraction, it is called a mixed quantity.

5. The reciprocal of a fraction, is a fraction whose numerator is the denominator of the other; and whose denominator is the numerator of the other. The reciprocal of an integer is the quotient of 1 divided by that integer. Thus, \( a \div b \) is the reciprocal of \( a \); and \( b \) is the reciprocal of \( m \).

The distinctions in Def. 2, 3, 4, properly belong to common arithmetic, from which they are borrowed, and are scarcely used in algebra.

The operations concerning fractions are founded on the following propositions:

If the divisor and dividend be either both multiplied or both divided by the same quantity, the quotient is the same; or, if both the numerator and denominator of the fraction be either multiplied or divided by the same quantity, the value of that fraction is the same.

Thus, let \( \frac{a}{b} = c \); then \( \frac{ma}{mb} = c \). For, from the nature of division, if the quotient \( \frac{a}{b} (= c) \) be multiplied by the divisor \( b \), the product must be the dividend \( a \). Hence \( \frac{a}{b} \times b = c \), and likewise \( \frac{ma}{mb} = c \), and dividing both by \( mb \), \( \frac{ma}{mb} = c \). Conversely, if \( \frac{ma}{mb} = c \), then also \( \frac{a}{b} = c \).

3 E 2  Cor.
Cor. 1. Hence a fraction may be reduced to another of the same value, but of a more simple form, by dividing both numerator and denominator by any common measure.

Thus, \[
\frac{30ax - 5a^2y}{12ab} = \frac{5x - 9y}{2b}.
\]

\[
\frac{8a^2 + 6bc}{4a^3} = \frac{a^2 + 3c}{2a}.
\]

Cor. 2. A fraction is multiplied by any integer, by multiplying the numerator, or dividing the denominator by that integer; and conversely, a fraction is divided by any integer, by dividing the numerator, or multiplying the denominator by that integer.

PROB. I. To find the greatest common Measure of two Quantities.

1. Of pure numbers.

Rule. Divide the greater by the less; and, if there is no remainder, the less is the greatest common measure required. If there is a remainder, divide the last divisor by it; and thus proceed, continually dividing the last divisor by its remainder, till no remainder is left, and the last divisor is the greatest common measure required.

The greatest common measure of 45 and 63 is 9; the greatest common measure of 187 and 391 is 17. Thus,

\[
\begin{array}{c|c}
45 & 63 \\
45 & 187 \\
18 & 391 \\
18 & 187 \\
9 & 187 \\
18 & 187 \\
0 & 0 \\
\end{array}
\]

From the nature of this operation, it is plain that it may always be continued till there be no remainder. The rule depends on the following principles:

1. A quantity which measures both divisor and remainder must measure the dividend.

2. A quantity which measures both divisor and dividend must also measure the remainder.

For a quantity which measures two other quantities, must also measure both their sum and difference; and, from the nature of division, the dividend consists of the divisor repeated a certain number of times, together with the remainder. By the first it appears, that the number found by this rule is a common measure; and, by the second, it is plain there can be no greater common measure: for, if there were, it must necessarily measure the quantity already found less than itself, which is absurd.

When the greatest common measure of algebraical quantities is required, if either of them be simple, any common simple divisor is easily found by inspection. If they are both compound, any common simple divisor may also be found by inspection. But, when the greatest compound divisor is wanted, the preceding rule is to be applied; only,

2. The simple divisors of each of the quantities are to be taken out, the remainders in the several operations are also to be divided by their simple divisors, and the quantities are always to be ranged according to the powers of the same letter.

The simple divisors in the given quantities, or in the remainders, do not affect a compound divisor which is wanted; and hence also, to make the division succeed, any of the divisors may be multiplied by a simple quantity. Besides the simple divisors in the remainders not being found in the divisors from which they arise, they may be divided by this operation.

Thus, the greatest common measure of \(8a^2b^2 - 10ab^3 + 2b^2\), and \(9a^4b - 9a^3b^2 + 3a^2b^3 - 3ab^4\). The simple divisors being taken out, viz. } 2b out of the first, it becomes \(4a - 5ab + b^3\); and } 2b out of the second, it is \(3a^2 - 3ab + b^2\). As the latter is to be divided by the former, it must be divided by \(a\), to make the operation succeed, and then it is as follows:

\[
\begin{align*}
a^2 - 5ab + b^2 & \quad 12a^2 - 12ab + 4b^2 - ab^3 \quad (3a) \\
& \quad 12a^2 - 15ab + 3b^2 \\
& \quad 3a^2 + 2b^3 - ab^2 \\
\end{align*}
\]

This remainder is to be divided by \(b\), and the new dividend multiplied by \(3\), to make the division proceed. Thus,

\[
\begin{align*}
3a^2 + ab - 4b^2 & \quad 12a^2 - 15ab + 3b^2 \quad (4) \\
& \quad 12a^2 + 4ab - 16b^2 \\
& \quad 19ab + 19b^2 \\
\end{align*}
\]

and this remainder, divided by \(19b\), gives \(a - b\), which being made a divisor, divides \(3a^2 + 4ab - 4b^2\) without a remainder, and therefore \(a - b\) is the greatest compound divisor: but there is a simple divisor \(b\), and therefore \(a - b\times b\) is the greatest common measure required.

PROB. II. To reduce a Fraction to its lowest Terms.

Rule. Divide both numerator and denominator by their greatest common measure, which may be found by prob. I.

Thus, \(75abc - 2\alpha^2\), \(25bc\) being the greatest common measure, \(a\), \(a^2\), \(a + b\) also,

\[
9a^2b - 9a^3b^2 + 3a^2b^3 - 3ab^2 = 9a^2 + 3ab^2 \quad 8a + 2b^2 \quad \text{the greatest common measure being } a - b \times b, \text{ by Prob. I.}
\]

PROB.
Part I. ALGEBRA.

Fundamental operations.

PROB. III. To reduce an Integer to the Form of a Fraction.

Rule. Multiply the given integer by any quantity for a numerator, and let that quantity under the product for a denominator.

Thus, \( \frac{ma}{n} \). \( a+\frac{b}{a-b} \). \( \frac{a^2-b^2}{2a} \).

Cor. Hence, in the following operations concerning fractions, an integer may be introduced; for, by this problem, it may be reduced to the form of a fraction. The denominator of an integer is generally made 1.

PROB. IV. To reduce Fractions with different Denominators to Fractions of Equal Value, that shall have the same Denominator.

Rule. Multiply each numerator, separately taken, into all the denominators but its own, and the products shall give the new numerators. Then multiply all the denominators into one another, and the product shall give the common denominator.

Example. Let the fractions be \( \frac{a}{b} \), \( \frac{c}{d} \); they are respectively equal to \( \frac{ad}{bd} \), \( \frac{bf}{df} \).

The reason of the operation appears from the preceding proposition; for the numerator and denominator of each fraction are multiplied by the same quantities; and the value of the fractions therefore is the same.

PROB. V. To add and subtract Fractions.

Rule. Reduce them to a common denominator, then add or subtract the numerators, and the sum or difference be over the common denominator is the sum or remainder required.

Ex. Add together \( \frac{2}{b} \), \( \frac{c}{d} \), the sum is \( \frac{ad+bf+bd}{bd} \).

From \( \frac{a}{b} \) sub. \( \frac{c}{d} \), the difference is \( \frac{ad-bc}{bd} \).

From the nature of division it is evident, that, when several quantities are to be divided by the same divisor, the sum of the quotients is the same with the quotient of the sum of the quantities divided by that common divisor.

In like manner, the difference of two fractions having the same denominator, is equal to the difference of the numerators divided by that common denominator.

Cor. 1. By Cor. Prob. 3, integers may be reduced to the form of fractions, and hence integers and fractions may be added and subtracted by this rule. Hence also what is called a mixt quantity may be reduced into the form of a fraction, by bringing the integral part into the form of a fraction, with the same denominator as the fractional part, and adding or subtracting the numerators as the two parts are connected by the signs + or -.

Thus, \( \frac{b}{d}+\frac{c}{d} \) and \( a-\frac{a^2-b^2}{2a} \) = \( \frac{2a^2-a^2+b^2}{2a} \).

Cor. 2. A fraction, whose numerator is a compound quantity, may be divided into parts, by dividing the numerator into several parts, and setting each over the original denominator, and uniting the new fractions (reduced if necessary) by the signs of their numerators.

Thus, \( \frac{a^2-2ab+b^2}{2a} \) \( a^2+ab+b^2 \) = \( \frac{a}{2a} \). \( \frac{a-b}{2a} \). \( \frac{a+b}{2a} \).

PROB. VI. To multiply Fractions.

Rule. Multiply their numerators into one another, to obtain the numerator of the product; and the denominators, multiplied into one another, shall give the denominator of the product.

Ex. \( \frac{a}{b} \), \( \frac{c}{d} \) \( \frac{ac}{bd} \) \( a+b \) \( \frac{a-b}{c} \) \( \frac{a^2-b^2}{c} \).

For, if \( \frac{a}{b} \) is to be multiplied by \( \frac{c}{d} \), the product is \( \frac{ac}{bd} \) but if it is to be multiplied only by \( \frac{a}{d} \) the former product must be divided by \( d \), and it becomes \( \frac{ac}{bd} \) (Cor. 2. to the preceding problem.)

Or, let \( \frac{a}{b} \equiv m \), and \( \frac{c}{d} \equiv n \). Then \( ac=bdm \), and \( ec=dam \), and \( ac-bd \equiv mn \). \( \frac{ac}{bd} \) = \( \frac{mn}{b} \).

PROB. VII. To divide Fractions.

Rule. Multiply the numerator of the dividend by the denominator of the divisor; their product shall give the numerator of the quotient. Then multiply the denominator of the dividend by the numerator of the divisor, and their product shall give the denominator.

Or, Multiply the dividend by the reciprocal of the divisor; the product will be the quotient wanted.

Thus, \( \frac{a}{b} \) \( \frac{c}{d} \) \( \frac{bc}{b} \) \( \frac{a}{d} \).

For, if \( \frac{c}{d} \) is to be divided by \( a \), the quotient is \( \frac{c}{ad} \) but \( \frac{c}{d} \) is to be divided, not by \( a \), but by \( \frac{a}{d} \), therefore the former quotient must be multiplied by \( b \), and it is \( \frac{bc}{ad} \).

Or, let \( \frac{a}{b} = m \), and \( \frac{c}{d} = n \); then \( ac=bdm \), and \( c=d \equiv n \) also \( ad=bdn \) and \( b=bd \); therefore \( \frac{b(\frac{c}{bd})}{ad} \). \( \frac{ac}{bd} \).

Scholium.

By these problems, the four fundamental operations may be performed, when any terms of the original quantities, or of those which arise in the course of the operation, are fractional.

Ex.-
Of Proportion. Example. 

\[
\text{Mult. } \frac{a^2}{2x} = \frac{3ax}{26},
\]

By \(ab = 4x\)

\[
\frac{a^2}{2x} = \frac{a^2}{2x} - 2a^2 + 6ax^2
\]

\[
a + x) (a + x) \frac{a^2}{2x} - 2x^2 - \frac{2x^2}{a}, \text{ &c.}
\]

\[
a + x
\]

\[
ax + x^2
\]

\[
2x^2
\]

\[
2x^2 + 2x^2
\]

\[
a
\]

\[
\frac{ax}{a}
\]

\[
\frac{2x^2}{a}
\]

\[
\frac{2x^3}{a^2}
\]

\[
+ 2x^4
\]

\[
a + x^2, \text{ &c.}
\]

This quotient becomes a series, of which the law of continuation is obvious, without any farther operation.

In such cases, when we arrive at a remainder of one term, it is commonly set down with the divisor below it, after the other terms of the quotient, which then becomes a mixed quantity. Thus the last quotient is also expressed by \(a - x + \frac{2x^3}{a + x}\).

\[\text{C H A P. II.} \]

Of Proportion.

By the preceding operations quantities of the same kind may be compared together.

The relation arising from this comparison is called ratio or proportion, and is of two kinds. If we consider the difference of the two quantities, it is called arithmetical proportion; and if we consider their quotient, it is called geometrical proportion. This last being most generally useful, is commonly called simply proportion.

1. Of Arithmetical proportion.

Definition. When of four quantities the difference of the first and second is equal to the difference of the third and fourth, the quantities are called arithmetical proportionals.

Cor. Three quantities may be arithmetically proportionals, by supposing the two middle terms of the four to be equal.

Prop. In four quantities arithmetically proportionals, the sum of the extremes is equal to the sum of the means.

Let the four be \(a, b, c, d\). Therefore from Def. \(a - b = d\); to these add \(b + d\) and \(a + d = b + c\).

\[\text{Cor. I. Of four arithmetical proportionals, any three being given, the fourth may be found.}\]

Thus, let \(a, b, c\), be the 1st, 2nd, and 4th terms, and let \(x\) be the third which is sought.

Then by Def. \(a + x = b + x\), and \(x = a + c - b\).

\[\text{Cor. II. If three quantities be arithmetical proportionals, the sum of the extremes is double of the middle term; and hence, of three such proportionals, any two being given, the third may be found.}\]

2. Of Geometrical Proportion.

Definition. If of four quantities, the quotient of the first and second is equal to the quotient of the third and fourth, these quantities are said to be in geometrical proportion. They are also called proportionals. Thus, if \(a, b, c, d\), are the four quantities, then \(\frac{a}{b} = \frac{c}{d}\), and their ratio is thus denoted \(a : b : c : d\).

Cor. Three quantities may be geometrical proportionals, viz. by supposing the two middle terms of the four to be equal. If the quantities are \(a, b, c\), then \(\frac{a}{b} = \frac{c}{d}\), and the proportion is expressed thus, \(a : b : c\).

Prop. I. The product of the extremes of four quantities geometrically proportionals is equal to the product of the means; and conversely.

Let \(a : b : c : d\).

Then by Def. \(\frac{a}{b} = \frac{c}{d}\);

and multiplying both by \(bd\), \(ad = bc\).

If \(ad = bc\), then dividing by \(bd\), \(\frac{a}{b} = \frac{c}{d}\); that is, \(a : b : c : d\).

Cor. 1. The product of the extremes of three quantities, geometrically proportional, is equal to the square of the middle term.

Cor. 2. Of four quantities geometrically proportional, any three being given, the fourth may be found.

Ex. Let \(a, b, c\), be the three first; to find the 4th. Let it be \(x\), then \(a : b : c : x\), and by this proposition, \(\frac{ax}{a} = \frac{bc}{d}\);

and dividing both by \(a\), \(x = \frac{bc}{a}\).

This coincides with the Rule of Three in arithmetic, and may be considered as a demonstration of it. In applying the rule to any particular case, it is only to be observed, that the quantities must be so connected and so arranged, that they be proportional, according to the preceding definition.

Cor. 3. Of three geometrical proportionals, any two being given, the third may be found.

Prop. II. If four quantities be geometrically proportional, then, if any equimultiples whatever be taken of the first and third, and also any equimultiples whatever of the second and fourth; if the multiple of the first be greater than that of the second, the multiple of the third will be greater than that of the fourth; and if equal, equal; and if less, less.

For, let \(a, b, c, d\), be the four proportionals. Of the
Part I.

**ALGEBRA.**

**Of Equations.**

The first and third, $ma$ and $mc$ may represent any equimultiples whatever, and also $nb$, $nd$, may represent any equimultiples of the second and fourth. Since $a : b : c : d$, $ad=bc$; and hence multiply by $mn$, $mnad=mc$, and therefore (Conv. Prop. 1.) $ma : nb : mc : nd$; and from the definition of proportionals, it is plain, that if $ma$ is greater than $nb$, $mc$ must be greater than $nd$; and if equal, equal; and if less, less.

Prop. III. If four quantities are proportionals, they will also be proportionals when taken alternately or inverely, or by composition, or by division, or by conversion. See Def. 13. 14. 15. 16. 17. of Book V. of Euclid, Simson's edition.

By Prop. II. they will also be proportionals according to Def. 5. Book V. of Euclid; and therefore this proposition is demonstrated by propositions 16, B. 18, 17, E. of the same book.

Otherwise algebraically.

Let $a : b : c : d$, and therefore $ad=bc$.

Altern. $a : c : b : d$

Invert. $b : a : d : c$

Divid. $a-b : b-c : d : c$

Comp. $a+b : b+c : c+d : d$

Convert. $a : a-b : c : c-d$

For since $ad=bc$, it is obvious, that in each of these cases the product of the extremes is equal to the product of the means; the quantities are therefore proportionals. (Prop. 1.)

Prop. IV. If four numbers be proportionals, according to Def. 5. B. V. of Euclid, they will be geometrically proportionals, according to the preceding definition.

1st. Let the four numbers be integers, and let them be $a, b, c, d$. Then if $b$ times $a$ and $b$ times $c$ be taken, and also $a$ times $b$ and $a$ times $d$, since $bc$ is the multiple of the first is equal to $ab$ the multiple of the second, $bc$ the multiple of the third, must be equal to $ad$ the multiple of the fourth. And since $bc=ad$, by Prop. 1. $a, b, c$, and $d$, must be geometrical proportionals.

2nd. If any of the numbers be fractional, all the four being multiplied by the denominators of the fractions, they continue proportionals, according to Def. 5. B. V. Euclid (by Prop. 4. of that book); and the four integer quantities produced being such proportionals, they will be geometrical proportionals, by the first part of this prop.; and therefore, being reduced by division to their original form, they manifestly will remain proportionals, according to the algebraical definition.

**CHAP. III.**

**SECT. I. Of Equations in general, and of the Solution of Simple Equations.**

**Definitions.**

1. Any Equation may in general be defined to be a proposition asserting the equality of two quantities; and is expressed by placing the sign $=$ between the quantities.

2. When a quantity stands alone upon one side of an equation, the quantities on the other side are said to be a value of it. Thus in the equation $x=4+y-d$, $x$ stands alone on one side, and $b+y-d$ is a value of it.

3. When an unknown quantity is made to stand alone on one side of an equation, and there are only known quantities on the other, that equation is said to be unsolved; and the value of the unknown quantity is called a root of the equation.

4. Equations containing only one unknown quantity and its powers, are divided into orders, according to the highest power of the unknown quantity to be found in any of its terms.

If the highest power of the unknown quantity is $1$, the unknown quantity is called a Simple Equation.

If the highest power of the unknown quantity is $2$, the equation is called a Quadratic.

If the highest power of the unknown quantity is $3$, the equation is called a Cubic, &c.

But the exponents of the unknown quantity are supposed to be integers, and the equation is supposed to be cleared of fractions, in which the unknown quantity, or any of its powers, enter the denominators.

Thus, $x^3-5=12$, when cleared of the fraction by multiplying both sides by $2x$, becomes $6x^4-10=24x$; a quadratic.

$x^3-2x^2+x=20$ is an equation of the fifth order, &c.

As the general relations of quantity which may be treated of in algebra, are almost universally either that of equality, or such as may be reduced to that of equality, the doctrine of equations becomes one of the chief branches of the science.

The most common and useful application of algebra is in the investigation of quantities that are unknown, from certain given relations to each other, and to such as are known; and hence it has been called the analytical art. The equations employed for expressing these relations must therefore contain one or more unknown quantities; and the principal business of this art will be, the deducing equations containing only one unknown quantity, and resoluing them.

The solution of the different orders of equations will be successively explained. The preliminary rules in the following section are useful in all orders, and are alone sufficient for the solution of simple equations.

§ 1. Of Simple Equations, and their Resolusion.

Simple equations are resolved by the four fundamental operations already explained; and the application of them to this purpose is contained in the following rules.

**Rule 1. Any equation may be transposed from one side of an equation to the other, by changing its sign.**

Thus, if $3x-10=2x+5$

Then, $3x-2x=10+5$ or $x=15$

Thus also, $5x+6=2x+2x$

By transp. $3x=-5$.

This rule is obvious from prob. 1. and 2.; for it is equivalent to adding equal quantities to both sides of the equation, or to subtracting equal quantities from both sides.

**Cor.**
Cor. The signs of all the terms of an equation may be changed into the contrary signs, and it will continue to be true.

Rule 2. Any quantity by which the unknown quantity is multiplied may be taken away, by dividing all the other quantities of the equation by it.

Thus, if \[ ax = b \]
\[ x = \frac{b}{a} \]

Also, if \[ mx + nb = am \]
\[ x = \frac{am - nb}{m} \]

For if equal quantities are divided by the same quantity, the quotients are equal.

Rule 3. If a term of an equation is fractional, its denominator may be taken away, by multiplying all the other terms by it.

Thus, if \[ \frac{ab + c}{x} \]
\[ x = \frac{ab + c}{a} \]

Also, if \[ \frac{x - c}{x} \]
\[ x = \frac{x - c}{b} \]

And by trans. \[ x = \frac{a}{b} \]

And by div. \[ x = \frac{a}{b} \]

For if all the terms of the equation are multiplied by the same quantity, it remains the true proposition.

Corollary to the three last Rules.

If any quantity be found on both sides of the equation, with the same sign, it may be taken away from both. (Rule 1.)

Also, if all the terms in the equation are multiplied or divided by the same quantity, it may be taken out of them all. (Rule 2 and 3.)

Ex. If \[ 3x + 4 = a + b, \] then \[ 3x = b. \]
If \[ 2ax + 3ab = am + a, \] then \[ 2x + 3b = m + a. \]

If \[ \frac{x - 4}{3} = \frac{16}{3} \]
then \[ x = 16. \]

Any simple equation may be resolved by these rules in the following manner. \( \frac{1}{2} \) All fractions may be taken away by R. 3. \( \frac{1}{2} \) All the terms including the unknown quantity, may be brought to one side of the equation, and the known terms to the other, by R. 1. \( \frac{1}{2} \) If the unknown quantity is multiplied by any known quantity, it may be made to stand alone by R. 2, and the equation will then be resolved. Def. 3.

**Examples of Simple Equations resolved by these Rules.**

**I.**

If \[ 3x + 5 = x + 9 \]
R. 1. \[ x = 4 \]
R. 2. \[ x = \frac{4}{2} = 2 \]

**II.**

If \[ 5x - 5x + x = 2x + 26 \]
R. 1. \[ x = \frac{26}{2} = 13 \]
R. 2. \[ 30x - 15x = 8x = 84 \]

§ 2. Solution of Questions producing Simple Equations.

From the resolution of equations we obtain the resolution of a variety of useful problems, both in pure mathematics and physics, and also in the practical arts founded upon these sciences. In this place, we consider the application of it to those questions where the quantities are expressed by numbers, and their magnitude alone is to be considered.

When an equation, containing only one unknown quantity, is deduced from the question by the following rules, it is sometimes called a final equation. If it be simple, it may be resolved by the preceding rules; but if it be of a superior order, it must be resolved by the rules afterwards to be explained. The examples in this chapter are so contrived, that the final equation may be simple.

The rules given in this section for the solution of questions, though they contain a reference to simple equations only, are to be considered as general, and as applicable to questions which produce equations of any order.

**General Rule.** The unknown quantities in the question proposed must be expressed by letters, and the relation of the known and unknown quantities contained in it, or the conditions of it, as they are called, must be expressed by equations. These equations being resolved by the rules of this science, will give the answer of the question.

For example, if the question is concerning two numbers, they may be called \( x \) and \( y \), and the conditions from which they are to be investigated must be expressible by equations.

Thus, if it be required that the sum of two numbers found by \( x + y = 60 \) be 60, that condition is expressed thus

If their difference must be 24, then \( x - y = 24 \)
If their product is 1640, then \( xy = 1640 \)
If their quotient must be 6, then \( \frac{x}{y} = 6 \)
If their ratio is as 3 to 2, then \( \frac{x}{y} = \frac{3}{2} \), and therefore \( 2x = 3y \)

These are some of the relations which are most easily expressible. Many others occur which are less obvious; but as they cannot be described in particular rules, the algebraical expression of them is best explained by examples, and must be acquired by experience.
Part I.

A distinct conception of the nature of the question, and of the relations of the several quantities to which it refers, will generally lead to the proper method of stating it, which in effect may be considered only as a translation from common language into that of algebra.

Case I. When there is only one unknown quantity to be found.

Rule. An equation involving the unknown quantity must be deduced from the question (by the general rule). This equation being resolved by the rules of the last section, will give the answer.

It is obvious, that, when there is only one unknown quantity, there must be only one independent equation contained in the question; for any other would be unnecessary, and might be contradictory to the former.

Examp. 1. To find a number, to which if there be added a half, a third part, and a fourth part of itself, the sum will be 50.

Let it be $z$; then half of it is $\frac{z}{2}$, a third of it $\frac{z}{3}$, &c. Therefore $2z + \frac{z}{3} + \frac{z}{4} = 50$.

If the operation be more complicated, it may be useful to register the several steps of it, as in the following.

Examp. 2. A trader allows L.100 per annum for the expences of his family, and augments yearly that part of his stock which is not so expended by a third of it; at the end of three years his original stock was doubled. What had he at first?

By R. 3.

By R. 1.

By R. 2.

Therefore his stock was L.1480; which being tried, answers the conditions of the question.

Case II. When there are two unknown quantities.

Rule. Two independent equations involving the two unknown quantities, must be derived from the question. A value of one of the unknown quantities must be derived from each of the equations; and these two values being put equal to each other, a new equation will arise, involving only one unknown quantity, and may therefore be resolved by the preceding rule.

Two equations must be deduced from the question: for, from one including two unknown quantities, it is plain, a known value of either of them cannot be obtained, more than two equations would be unnecessary; and if any third condition were affirmed at pleasure, most probably it would be inconsistent with the other two, and a question containing three such conditions would be absurd.

It is to be observed, however, that the two conditions, and hence the two equations expressing them, must be independent; that is, the one must not be deducible from the other by any algebraical reasoning: for, otherwise, there would in effect be only one equa-

Vol. I.
Examp. 4. A gentleman distributing money among some poor people, found he wanted 10£. to be able to give 5s. to each; therefore he gives each 4s. only and finds he has 45s. left. To find the number of shillings and poor people.

If any question such as this, in which there are two quantities sought, can be resolved by means of one letter, the solution is in general more simple than when two are employed. There must be, however, two independent conditions; one of which is used in the notation of one of the unknown quantities, and the other gives an equation.

Let the number of poor be $x$.

The number of shillings will be $y = x - 10$.

By 2 and 3.

The operation might be a little shortened by fabricating the 4th from 5th and thus $14 = y + z$; and hence $y = 21$. Therefore (by 6th) $x = (3y - 14) = 49$.

Examp. 5. A courier sets out from a certain place, and travels at the rate of 7 miles in 3 hours, and 8 hours after, another sets out from the same place, and travels the same road, at the rate of 5 miles in 3 hours. I demand how long and how far the first must travel before he is overtaken by the second.

Let the number of hours which the first travelled be $y$.

Then the second travelled $y + 8$.

The first travelled seven miles in 5 hours, and therefore in $y$ hours $3(5:7::y:z).$ 7 miles

In like manner the second travelled $5y - z$, miles.

But they both travelled the same number of miles; therefore by 3, and 4.

Malt.

The first then travelled $5y$ hours, the second ($y - 8 = z$) 42 hours.

The miles travelled by each $\left(\frac{7y}{5} = \frac{5y - 40}{3}\right) = 70$.

Examp. 7. To find a number consisting of three places, whose digits are in arithmetical proportion; if this number be divided by the sum of its digits, the quotient will be 48; and if from the number be subtracted 198, the digits will be inverted.

Let the 3 digits be $x, y, z$.

Then the number is $100z + 10y + x$.

If the digits be inverted, it is $100x + 10y + z$.

The digits are in ar. prop.

therefore $4x + z = 2y$.

By question $100x + 10y + z = 48$.

By question $x + y + z = 2y$.

From 6 and trans. $790x = 992 + 198$.

Divid. by 99 $8x = z + 2$.

From 4 $x = 2y - z$.

8 and 9 $10y - z = y + 2$.

Trans. $11y = 2y + 4$.

Malt. $5x + 10y + 5z = 48y + 48y + 48y$.

Trans. $52z = 38y + 47x$.

8 and 11 sub. $7x + 10y = 8y + 38 + 47z$.

Trans. $15y = 66$.

Divid. $16y = 2.6$.

The number then is 432, which succeeds upon trial.
Part I. A L G E B R A. 411

Of Equations. It sometimes happens, that all the unknown quantities, when there are more than two, are not in all the equations expressing the conditions, and therefore the preceding rule cannot be literally followed. The solution, however, will be obtained by such substitutions as are used in Ex. 7 and 9, or by similar operations, which need not be particularly described.

Corollary to the preceding Rules.

It appears that, in any question, there must be as many independent equations as unknown quantities; if there are not, then the question is called indeterminate, because it may admit of an infinite number of answers, since the equations wanting may be assumed at pleasure. There may be other circumstances, however, to limit the answers to one, or a precise number, and which, at the same time, cannot be directly expressed by equations. Such are the fact, that the numbers must be integers, squares, cubes, and many others. The solution of such problems, which are also called diophantine, shall be considered afterwards.

Scholium.

On many occasions, by particular contrivances, the operations by the preceding rules may be much abridged. This however, must be left to the skill and practice of the learner. A few examples are the following.

1. It is often easy to employ fewer letters than there are unknown quantities, by expressing some of them from a simple relation to others contained in the conditions of the question. Thus, the solution becomes more easy and elegant. (See Ex. 4. 5.)

2. Sometimes it is convenient to express by letters, not the unknown quantities themselves, but some other quantities connected with them, as their sum, difference, &c. while from which they may be easily derived. (See Ex. 1 of chap. 5.)

In the operation also, circumstances will suggest a more easy road than that pointed out by the general rules. Two of the original equations may be added together, or may be substracted; sometimes they must be previously multiplied by some quantity, to render such addition or subtraction effectual, in exterminating one of the unknown quantities, or otherwise promoting the solution. Substitutions may be made of the values of quantities, in place of quantities themselves, and various other such contrivances may be used, which will render the solution much less complicated. (See Ex. 3, 7 and 9.)

Sect. II. General Solution of Problems.

In the solutions of the questions in the preceding part, the given quantities (being numbers) disappear in the last conclusion, so that no general rules for like cases can be deduced from them. But if letters are used to denote the known quantities, as well as the unknown, a general solution may be obtained, because, during the whole course of the operation, they retain their original form. Hence also the connection of the quantities will appear in such a manner as to discover the necessary limitations of the data, when there are any, which is essential to the perfect solution of a problem. From this method, too, it is easy to derive a synthesis demonstration of the solution.

When letters, or any other such symbols, are employed to express all the quantities, the algebra is sometimes called literal or literal.

Examp. 8. To find two numbers, of which the sum and difference are given.

Let \( s \) be the given sum, and \( d \) the given difference. Also, let \( x \) and \( y \) be the two numbers sought.

\[
\begin{align*}
&x + y = s, \\
&x - y = d
\end{align*}
\]

Whence \[
\begin{align*}
x &= \frac{s + d}{2}, \\
y &= \frac{s - d}{2}
\end{align*}
\]

Thus, let the given sum be 124, and the difference 24. Then \( x = \frac{124 + 24}{2} = 74 \) and \( y = \frac{124 - 24}{2} = 50 \).

In the same manner may the canon be applied to any other values of \( s \) and \( d \). By reversing the steps in the operation, it is easy to show, that if \( x = \frac{s + d}{2} \) and \( y = \frac{s - d}{2} \), the sum of \( x \) and \( y \) must be \( s \), and their difference \( d \).

Examp. 9. If \( A \) and \( B \) together can perform a piece of work in the time \( a \), \( A \) and \( C \) together in the time \( b \), and \( B \) and \( C \) together in the time \( c \), in what time will each of them perform it alone?

Let \( A \) perform the work in the time \( x \), \( B \) in \( y \), and \( C \) in \( z \); then as the work is the same in all cases, it may be represented by unity.

\[
\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = \frac{1}{a} \cdot \frac{1}{b} + \frac{1}{c}
\]

By

\[
\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = \frac{1}{a} \cdot \frac{1}{b} + \frac{1}{c}
\]
## Algebra

**Of Equations.**

If particular values be inserted for these letters, a particular solution will be obtained for each case. Let them denote the numbers in Example 5.

Then \( x = \frac{gra}{qr - ps} = \frac{5 \times 5 \times 8}{5 \times 5 - 7 \times 3 - \frac{200}{4}} = 50 \).

Here it is obvious, that \( qr \) must be greater than \( ps \), else the problem is impossible; for then the value of \( x \) would either be infinite or negative. This limitation appears also from the nature of the question, as the second courier must travel at a greater rate than the first, in order to overtake him. For the rate of the first courier is to the rate of the second as \( x \) to \( y \), that is, as \( ps \) to \( qr \); and therefore \( qr \) must be greater than \( ps \).

**Scholium.**

Sometimes when there are many known quantities in a general solution, it may simplify the operation to express certain combinations of them by new letters, still to be considered as known.

**Of Involution and Evolution.**

### LE_\text{mma.}

The reciprocals of the powers of a quantity may be expressed by that quantity, with negative exponents of the same denomination. That is, the series \( a, \frac{1}{a}, \frac{1}{a^2}, \frac{1}{a^3}, etc. \), may be expressed by \( a^1, a^{-1}, a^{-2}, a^{-3}, etc. \)

For the rule for dividing the powers of the same root to subtract the exponents; if then the index of the divisor be greater than that of the dividend, the index of the quotient must be negative.

Thus, \( a^2 = a^{1-1} = a^{-1} \). Also, \( a^{1/2} = \frac{1}{a^{1/2}} \).

And, \( \frac{a^n}{b^n} = a^{n-m} = a^m \). And, \( \frac{a^m}{b^n} = a^{m-n} \), etc.

### Cor. 1.\text{ Hence any quantity which multiplies either the numerator or denominator of a fraction, may be transposed from one to the other, by changing the sign of its index.}

Thus, \( \frac{x}{y} = y \cdot x^{-1} \). And \( \frac{a^x}{y^1} = a^x \cdot y^{-1} \), etc.

### Cor. 2. From this notation, it is evident that these negative powers, as they are called, are multiplied by adding, and divided by subtracting their exponents.

Thus, \( a^{-1} \cdot a^{-1} = a^{-2} \). Or, \( \frac{1}{a^1} \cdot \frac{1}{a^1} = a^{-2} \).

Or, \( \frac{a^{-1}}{a^{-1}} = a^{-1} \). Or, \( \frac{a^{1/2}}{a^{1/2}} = a^{1/2} \).
Part I.

A L G E B R A.

I. Of Involution.

To find any power of any quantity is the business of involution.

Case 1. When the quantity is simple.

Rule. Multiply the exponents of the letters by the index of the power required, and raise the coefficient to the same power.

Thus, the 2d power of \( a^4 \) is \( a^{4\times2} = a^8 \).

The 3d power of \( 2a^4 \) is \( 8a^4 \times 3 = 8a^{12} \).

The 3d power of \( 3ab^4 \) is \( 27a^4 \times b^4 \times 3 = 27a^4b^4 \).

For the multiplication would be performed by the continued addition of the exponents; and this multiplication of them is equivalent. The same rule holds when the signs of the exponents are negative.

Rule for the signs. If the sign of the given quantity is \(+\), all its powers must be positive. If the sign is \( -\), then all its powers whose exponents are even numbers are positive; and all its powers whose exponents are odd numbers are negative.

This is obvious from the rule for the signs in multiplication.

The last part of it implies the most extensive use of the signs \(+\) and \( -\), by supposing that a negative quantity may exist by itself.

Case 2. When the quantity is compound.

Rule. The powers must be found by a continual multiplication of it by itself.

Thus, the square of \( x + a \) is found by multiplying it into itself. The product is \( x^2 + 2ax + a^2 \). The cube of \( x + a \) is got by multiplying the square already found by the root, &c.

Fractions are raised to any power, by raising both numerator and denominator to that power, as is evident for the rule for multiplying fractions in Chap. I. § 2.

The involution of compound quantities is rendered much easier by the binomial theorem; for which see Chap. VI.

Note. The square of a binomial consists of the squares of two parts, and twice the product of the two parts.

II. Of Evolution.

Evolution is the reverse of involution, and by it powers are resolved into their roots.

Def. The root of any quantity is expressed by placing before it \( \sqrt{\text{ }} \) (called a radical sign) with a small figure above it, denoting the denomination of that root.

Thus, the square root of \( a \), is \( \sqrt{a} \) or \( a^{\frac{1}{2}} \).

The cube root of \( bc \), is \( \sqrt[3]{bc} \).

The 4th root of \( a^b - b^a \), is \( \sqrt[4]{a^b - b^a} \).

The \( n \)th root of \( e^{ax} \) is \( e^{\frac{ax}{n}} \).

General Rule for the Signs.

1. The root of any positive power may be either positive or negative, if it is denominated by an even number; but if the root is denominated by an odd number, it is positive only.

2. If the power is negative, the root also is negative, when it is denominated by an odd number.

3. If the power is negative, and the denomination of the root even, then no root can be assigned.

This rule is easily deduced from that given in involution, and supposes the same extensive use of the signs \(+\) and \( -\). If it is applied to abstract quantities in which a contrariety cannot be supposed, any root of a positive quantity must be positive only; and any root of a negative quantity, like itself, is unintelligible.

In the last case, though no root can be assigned, yet sometimes it is convenient to set the radical sign before the negative quantity, and then it is called an impossible or imaginary root.

The root of a positive power, denominated by an even number, has often the sign \( = \) before it, denoting that it may have either \( + \) or \( - \).

The radical sign may be employed to express any root of any quantity whatever; but sometimes the root may be accurately found by the following rules; and when it cannot, it may often be more conveniently expressed by the methods now to be explained.

Case I. When the quantity is simple.

Rule. Divide the exponents of the letters by the index of the root required, and prefix the root of the numeral coefficient.

1. The exponents of the letters may be multiples of the index of the root, and the root of the coefficient may be extracted.

Thus, the square root of \( a^4 = a^2 = a^{\frac{2}{4}} \).

\( \sqrt{27a^9} = 3a^3 = 3a^{\frac{3}{1}} \).

\( \sqrt{a^{6b^2}} = a^{3b} \cdot b^{\frac{1}{2}} = \frac{3a^{3b}}{2} \).

2. The exponents of the letters may not be multiples of the index of the root, and then they become fractions; and when the root of the coefficient cannot be extracted, it may also be expressed by a fractional exponent, its original index being understood to be 1.

Thus, \( \sqrt[4]{16a^2b^2} = 4ab \).

\( \sqrt[3]{7ax^2} = \frac{7}{x} a^x = \frac{7}{2} x a^{\frac{1}{2}} \).

As evolution is the reverse of involution, the reason of the rule is evident.

The root of any fraction is found by extracting that root out of both numerator and denominator.

Case II. When the quantity is compound.

1. To extract the square root.

Rule. 1. The given quantity is to be ranged according to the powers of the letters, as in division.

Thus,
Thus, in the example \(a^2 + 2ab + b^2\), the quantities are ranged in this manner.

2. The square root is to be extracted out of the first term (by preceding rules), which gives the first part of the root fought. Subtract its square from the given quantity, and divide the first term of the remainder by double the part already found, and the quotient is the second term of the root fought.

Thus, in this example, the remainder is \(2ab + b^2\); and \(2ab\) being divided by \(2a\), the double of the part found, gives \(b\) for the second part of the root.

3. Add this second part to double of the first, and multiply their sum by the second part: Subtract the product from the last remainder, and if nothing remain, the square root is obtained. But, if there is a remainder, it must be divided by the double of the parts already found, and the quotient would give the third part of the root; and so on.

In the last example, it is obvious, that \(a+b\) is the square root fought.

The entire operation is as follows.

\[
\frac{a^2 + 2ab + b^2}{a^2} = 2a + b + \frac{2ab + b^2}{2a + b}
\]

\[
x^2 - ax + a' = \frac{x^2 - a}{2}
\]

\[
x^2 - 2ax + a^2 = \frac{x^2 - 2a + a^2}{4}
\]

\[
x^2 - 2ax + a^2 = \frac{x^2 - 2a + a^2}{4}
\]

\[
x^2 - 2ax + a^2 = \frac{x^2 - 2a + a^2}{4}
\]

The reason of this rule appears from the composition of a square.

2. To extract any other root.

Rule. Range the quantity according to the dimensions of its letters, and extract the said root out of the first term, and that shall be the first member of the root required. Then raise this root to a dimension lower by unity than the number that denominates the root required, and multiply the power that arises by that number itself. Divide the second term of the given quantity by the product, and the quotient shall give the second member of the root required—in like manner are the other parts to be found, by considering those already got as making one term.

Thus, the fifth root of

\[
a^5 + 5a^4b + 10a^3b^2 + 10a^2b^3 + 5ab^4 + b^5 = (a + b)
\]

\[
5a^4 + 5a^3b
\]

And \(a+b\) raised to the 5th power is the given quantity, and therefore it is the root fought.

In evolution it will often happen, that the operation will not terminate, and the root will be expressed by a series.

Thus, the square root of \(a^4 + x^4\) becomes a series.

\[
\sqrt{a^4 + x^4} = \frac{a^2 + x^2}{2a + x}
\]

\[
x^2 = \frac{x^2}{4a^2}
\]

\[
\sqrt{a^4 + x^4} = \frac{a^2 + x^2}{2a + x}
\]

The extraction of roots by series is much facilitated by the binomial theorem (Chap. vi. Sect. 3.) By similar rules, founded on the same principles, are the roots of numbers to be extracted.

III. Of Surds.

Def. Quantities with fractional exponents are called surds, or imperfect powers.

Such quantities are also called irrational; in opposition to others with integral exponents, which are called rational.

Surds may be expressed either by the fractional exponents, or by the radical sign, the denominator of the fraction being its index; and hence the orders of surds are denominated from this index.

In the following operations, however, it is generally convenient to use the notation by the fractional exponents.

\[
a^\frac{1}{2} = \sqrt{a}, \sqrt{4ab^2} = 2ab.
\]

The operations concerning surds depend on the following principle: If the numerator and denominator of a fractional exponent be both multiplied or both divided by the same quantity, the value of the power is the same. Thus \(a^m = a^n\); for let \(a^m = b\); then \(a^n = b^m\), and \(a^n = b^m\), and extracting the root \(n\), \(a^\frac{m}{n} = \frac{b^m}{b^n}\).

Lem. A rational quantity may be put into the form of a surd, by reducing its index to the form of a fraction of the same value.

\[
a^\frac{1}{2} = \sqrt{a}, a^\frac{3}{4} = \sqrt{a^3}.
\]

Prob. I. To reduce surds of different denominations to others of the same value and of the same denomination.

Rule.
Part I. 

ALGEBRA.

Rule. Reduce the fractional exponents to others of the same value and having the same common denominator.

Ex. \( \sqrt[3]{a^2} \), \( \sqrt[3]{b^3} \) or \( a^\frac{2}{3}, b^\frac{1}{3} \)

but \( a^\frac{1}{2} = \sqrt[2]{a} \) and \( b^\frac{1}{2} = \sqrt[2]{b} \).

therefore \( \sqrt[3]{a} \) and \( \sqrt[3]{b} \) are respectively equal to \( a^\frac{1}{3} \) and \( b^\frac{1}{3} \).

PROB. II. To multiply and divide surds.

1. When they are surds of the same rational quantity, add and subtract their exponents.

Thus, \( a^\frac{1}{2} \times a^\frac{1}{2} = a^{\frac{1}{2} + \frac{1}{2}} = a\sqrt{a} \)

\( \sqrt{a^2 - b^2} = \sqrt{a^2 - b^2} \)

\( a + b \) and \( a^\frac{1}{2} \times b^\frac{1}{2} = a^{\frac{1}{2}} b^{\frac{1}{2}} \)

\( \sqrt{a^2 - b^2} = \sqrt{a^2 - b^2} \)

\( a^\frac{1}{2} b^\frac{1}{2} = a^{\frac{1}{2}} b^{\frac{1}{2}} \)

If the surds have any rational coefficients, their product or quotient must be prefixed. Thus, \( a\sqrt{m} b\sqrt{n} = ab\sqrt{mn} \). It is often convenient, in the operations of this problem, not to bring the surds of simple quantities to the same denomination, but to express their product or quotient without the radical sign, in the same manner as if they were rational quantities. Thus, the product in Ex. 1. may be \( a^{\frac{1}{2}} b^{\frac{1}{2}} \), and the quotient in Ex. 3. \( a^\frac{1}{2} b^\frac{1}{2} \).

Cor. If a rational coefficient be prefixed to a radical sign, it may be reduced to the form of a surd by the lemma, and multiplied by the problem; and conversely, if the quantity under the radical sign be divisible by a perfect power of the same denomination, it may be taken out, and its root prefixed as a coefficient.

\( a\sqrt{b} = a\sqrt{b} \times 2 \times \sqrt{\frac{b}{2}} \)

\( \text{Conv. } a\sqrt{b} = ab \sqrt{\frac{b}{a}} \sqrt{\frac{a^2 - b^2}{b}} = 2a\sqrt{1 - \frac{b}{a}} \).

Even when the quantity under the radical sign is not divisible by a perfect power, it may be useful sometimes to divide surds into their component factors, by reversing the operation of this problem.

Thus \( \sqrt{a^2 - b^2} = \sqrt{a + b} \times \sqrt{a - b} \times \sqrt{\frac{b}{a + b}} \times \sqrt{\frac{a}{a - b}} \)

\( \times \sqrt{a + x} = \sqrt{a + x} \times \sqrt{a + x} \times \sqrt{a + x} \times \sqrt{a + x} \).

PROB. III. To involve or resolve Surds.

This is performed by the same rules as in other quantities, by multiplying or dividing their exponents by the index of the power or root required.

The notation by negative exponents, mentioned in the lemma at the beginning of this chapter, is applicable to fractional exponents, in the same manner as to integers.

Scholium.

The application of the rules of this chapter to the resolving of equations, shall be explained in the succeeding chapters, which treat of the solution of the different classes of them; but some examples of their use in preparing equations for a solution are the following.

If a member of an equation be a surd root, then the equation may be freed from any surd, by bringing that member first to stand alone upon one side of the equation, and then taking away the radical sign from it, and raising the other side to the power denominated by the index of that surd.

This operation becomes a necessary step towards the solution of an equation, when any of the unknown quantities are under the radical sign.

Example. If \( 3\sqrt{a^2 - x^2} = 3x = x + y \)

Then \( 3\sqrt{a^2 - x^2} = x + y \)

and \( 9\times \sqrt{a^2 - x^2} = x^2 - 2xy + y^2 \).

If the unknown quantity is found only under the radical sign, and only of the first dimension, the equation will become simple, and may be resolved by the preceding rules.

Thus, if \( \sqrt{4x^2 + 10x + 5} = 9 \)

Then \( \sqrt{4x^2 + 16x + 9} = 4 \)

And \( 4x + 16 = 4 \)

\( 4x = 48 \)

And \( x = 12 \).

If \( m\sqrt{a^2 - b^2} = x \)

Then \( a^\frac{1}{2} b^\frac{1}{2} x = a^\frac{m}{a^\frac{1}{2} b^\frac{1}{2}} \)

\( x \times \frac{a^m}{a^\frac{1}{2} b^\frac{1}{2}} \).

If the unknown quantity in a final equation has fractional exponents, by means of the preceding rules a new equation may be substituted, in which the exponents of the unknown quantity are integers.

Thus, if \( \sqrt{x^2 + 3x^2} = 10 \)

by reducing the surds to the same denomination, it becomes \( x^2 + 3x^2 = 10 \)

and if \( x = 2x^2 = 10 \); and if this equation be resolved from a value of \( x \), a value of \( x \) may be got by the rules of the next chapter. Thus, if \( x^2 + 2x^2 = 100 \)

If \( x^2 = z \), this equation becomes \( z^2 + 2z^2 = 100 \).

In general, if \( x^2 + x = a \), by reducing the surds to the same denomination \( \frac{a}{a^\frac{1}{2}} + \frac{x}{a^\frac{1}{2}} = a \), and if \( x = \frac{a}{a^\frac{1}{2}} \), then the equation is \( \frac{a}{a^\frac{1}{2}} + \frac{x}{a^\frac{1}{2}} = a \), in which the
EQUATIONS were divided into orders according to the highest index of the unknown quantity in any term. (chap. 3.)

Equations are either pure or affected.

Def. 1. A pure equation is that in which only one power of the unknown quantity is found.

2. An affected equation, is that in which different powers of the unknown quantity are found in the several terms.

Thus, \( a^2 + ax = b^2 \), \( ax - b \equiv x^2 \), \( ax - b \equiv m^2 + x^4 \) are pure equations.

And \( x^2 - ax = b^2, x^2 + x^4 = 17 \), are affected.

1. Solution of pure Equations.

Rule. Make the power of the unknown quantity to stand alone by the rules formerly given, and then extract the root of the same denomination out of both sides, which will give the value of the unknown quantity.

Examples.

If \( a^2 + ax^2 = b^2 \), \( ax^2 = b^2 - ax \), \( ax^2 - a^2 = b^2 - b \),

Then by Ex. 8, chap. 3.

The proportions are

\[ \frac{a + x}{2} : \frac{b + y}{2} : \frac{b - y}{2} : \frac{a - z}{2} \]

Mult. by 2 and still

\[ a + x : b + y : b - y : a - z \]

From the three first-

\[ a + x : b + y : b - y : a - z \]

From the three last-

\[ a + x : b + y : b - y : a - z \]

3d added to 4th

\[ 2ab - 2y = 2b + 2y \]

4th subtr. from 3d

\[ 2ab - 2y = 2b + 2y \]

6th reduced

\[ 2b + 2y \]

7th subtr. for \( z \) in 5th

\[ 2b + 2y \]

Transp. and divide 8th by \( \frac{5}{2} \)

\[ \frac{a + b}{2} \]

In numbers

\[ \frac{a + b}{2} \]

Hence the four proportionals are 5, 6, 2, 1; and it appears that \( b \) must be greater than \( a \), otherwise the root becomes impossible, and the problem would also be impossible; which limitation might be deduced also from prop. 25. V. of Euclid.

2. Solution of affected Quadratic Equations.

Affected equations of different orders are resolved by different rules, successively to be explained.

An affected quadratic equation (commonly called a quadratic) involves the unknown quantity itself, and also its square; it may be resolved by the following rules.

1. Transpose all the terms involving the unknown quantity to one side, and the known terms to the other; and so that the term containing the square of the unknown quantity may be positive.

2. If the square of the unknown quantity is multiplied by any coefficient, all the terms of the equation are to be divided by it, so that the coefficient of the square of the unknown quantity may be 1.

3. Add to both sides the square of half the coefficient of the unknown quantity itself, and the side of the equation involving the unknown quantity will be a complete square.

4. Extract.
Part I.

Equation. 4. Extract the square root from both sides of the equation, by which it becomes simple, and by transferring the abovementioned half coefficient, a value of the unknown quantity is obtained in known terms, and therefore the equation is resolved.

The reason of this rule is manifest from the composition of the square of a binomial, for it consists of the squares of the two parts, and twice the product of the two parts. (Note, at the end of Chap. IV.)

The different forms of quadratic equations, expressed in general terms, being reduced by the first and second parts of the rule, are these:

1. \( x^2 + ax = b^2 \)
2. \( x^2 - ax = b^2 \)
3. \( x^2 - ax = b^2 \)

Cafe 1. \( x^2 + ax + \frac{a^2}{4} = b^2 + \frac{a^2}{4} \)
\[ x + \frac{a}{2} = \sqrt{b^2 + \frac{a^2}{4}} \]
\[ x = \sqrt{b^2 + \frac{a^2}{4}} - \frac{a}{2} \]

Cafe 2. \( x^2 - ax + \frac{a^2}{4} = b^2 + \frac{a^2}{4} \)
\[ x - \frac{a}{2} = \sqrt{b^2 + \frac{a^2}{4}} \]
\[ x = \sqrt{b^2 + \frac{a^2}{4}} + \frac{a}{2} \]

Cafe 3. \( x^2 - ax = b^2 - \frac{a^2}{4} \)
\[ x - \frac{a}{2} = \sqrt{b^2 - \frac{a^2}{4}} \]
\[ x = \sqrt{b^2 - \frac{a^2}{4}} + \frac{a}{2} \]

Of these cases it may be observed,
1. That if \( a \) be supposed, that the square root of a positive quantity may be either positive or negative, according to the most extensive use of the signs, every quadratic equation will have two roots, except such of the third form, whose roots become impossible.
2. It is obvious, that in the two first forms, one of the roots must be positive, and the other negative.
3. In the third form, \( a \) or the square of half the coefficient of the unknown quantity, be greater than \( b^2 \), the known quantity, the two roots will be positive. If \( a \) be equal to \( b^2 \), the two roots then become equal.

But \( a \) in this third case \( \frac{a}{4} \) is less than \( b^2 \), the quantity under the radical sign becomes negative, and the two roots are therefore impossible. This may be easily shown to arise from an impossible supposition in the original equation.

4. If the equation, however, expresses the relation of magnitudes abstractly considered, where a contrariety cannot by supposition to take place, the negative roots cannot be of use, or rather there are no such roots:

Vol. I.

for then a negative quantity by itself is unintelligible, Equation, and therefore the square root of a positive quantity must be positive only. Hence, in the two first cases, there will be only one root; but in the third, there will be two. For in the third case, \( ax^2 = b^2 \), or \( ax = x^2 \), it is obvious that \( x \) may be either greater or less than \( a \), and yet \( x \) may be positive, and hence \( ax = x \) is also positive, and may be equal to a given positive quantity \( b^2 \); therefore the square root of \( x^2 = ax + b^2 \) may be either \( x + \frac{a}{2} \) or \( x - \frac{a}{2} \), and both these quantities also positive.

Let then \( x = \frac{a}{2} = \sqrt{b^2 - \frac{a^2}{4}} \), and hence \( x = \frac{a}{2} - \sqrt{b^2 - \frac{a^2}{4}} \), and these are the same two positive roots as were obtained by the general rule.

The general rule is usually employed, even in questions where negative numbers cannot take place, and then the negative roots of the two first forms are neglected. Sometimes one only even of the positive roots of the third case can be used, and the other may be excluded by a particular condition in the question. When an impossible root arises in the solution of a question, and if it be resolved in general terms, the necessary limitation of the data will be discovered.

When a question can be so stated as to produce a pure equation, it is generally to be preferred to an affected. Thus the question in the preceding section, by the most obvious notation, would produce an affected equation.

2. Solution of Questions producing Quadratic Equations.

The expression of the conditions of the question by equations, or the stating of it, and the reduction likewise of these equations, till we arrive at a quadratic equation, involving only one unknown quantity and its square, are effected by the same rules which were given for the solution of simple equations in Chap III.

Examp. 2. One lays out a certain sum of money in goods, which he told again for 24.24, and gained as much per cent. as the goods cost him: 1 demand what they cost him?

If the money laid out be \( x \), then \( x + \frac{x}{100} = 24.24 \), and \( x = \frac{24.24 \times 100}{101} \).

The gain will be \( \frac{x}{100} \), and \( x + \frac{x}{10} = 24.24 \).

Therefore by question

And by rule and \( \frac{24.24 \times 100}{101} \). Completing the square

Extr. the root

Transp.

The answer is 20, which succeeds. The other root, 120, has no place in this example, a negative number being here unintelligible.

Any quadratic equation may be resolved also by the general canons at the beginning of this section. That
By inferring numbers, \( x = 71 \) or 29 and \( a - x = 29 \) equations, or 71, so that the two numbers sought are 71 and 29. Hence it is to be observed, that \( b \) must not be greater than \( a' \), else the roots of the equation would be impossible; that is, the given product must not be greater than the square of half the given sum of the numbers sought. This limitation can easily be shown from other principles; for, the greatest possible product of two parts, into which any number may be divided, is when each of them is a half of it. If \( b \) be equal to \( a' \), there is only one solution, and \( x = \frac{a}{2} \), also \( a - x = \frac{a}{2} \).

Example 5. There are three numbers in continual geometrical proportion. The sum of the first and second is 10, and the difference of the second and third is 24. What are the numbers?

Let the first be \( x \), the second will be \( 2(x - x^2) \), and the third \( \frac{34 - x}{2} \).

Since \( x + 10 = z \):
\[
\begin{align*}
4x^2 - 20x + 100 &= 34z - 2^2 \\
\text{Transp.} & \\
2z^2 - 54z &= -100 \\
\text{Divid.} & \\
6z^2 - 27z &= -50 \\
\text{Comp., the square} & \\
7z^2 - 27z + \frac{27^2}{2} &= \frac{27^2}{4} - 50 = \frac{529}{4} \\
\text{Extract the \( \sqrt{\frac{529}{4}} \)} & \\
8z - 27 &= \frac{23}{2} \\
\text{Transp.} & \\
9z &= 27 - \frac{23}{2} = 25 \text{ or } 2.
\end{align*}
\]

But though there are two positive roots in this equation, yet one of them only can here be of use, the other being excluded by a condition in the question. For as the sum of the first and second is 10, 25 cannot be one of them; 2 therefore is the first, and the proportional will be 2, 8, 32.

This restriction will also appear from the explanation given of the third form, to which this equation belongs. For \( z \) may be less than \( \frac{27}{2} \), but from the first condition of the question it cannot be greater; hence the quantity \( x - 27z + \frac{27^2}{2} \) can have only one square root, viz. \( \frac{27 - z}{2} \); and this being put equal to \( \sqrt{\frac{529}{4}} \), we have by transposition \( z = \frac{27 - 23}{2} = 2 \), which gives the only just solution of the question.

From the other root, indeed, a solution of the question may be represented by means of a negative quantity. If the first then be 25, the three proportional will be 25, -15, 9. These also must answer the conditions, according to the rules given for negative quantities, though such a solution has no proper meaning.

Besides, it is to be observed, that if the following question be proposed, 'To find three numbers in geometrical proportion, so that the difference of the 1st
and 2d may be 10, and the sum of the 2d and 3d may be 24; the equation in step 6th will be produced; for, if the 1st be 2, the second is $z-10$, and the third $34-z$, and therefore $34-z=z^2-20z+100$, the very same equation as in step 4th. In this question it is plain that the root 25 only can be useful, and the three proportions are 25, 15, 9.

But the necessary limitations of such a problem are properly to be derived from a general notation. Let the sum of the two first proportions be $a$, and the difference of the two last $b$. If $a$ is not greater than $b$, the first term must be the least; but if $a$ be greater than $b$, the first term must be either the greatest or the least.

When the first term is the least, the proper notation of the three terms is $z$, $a-z$, $a+b-z$, and the equation when ordered is $z^2-3a+b z-a^2$. If the first term be the greatest, and then $a$ is greater than $b$, the notation of the terms is $z$, $a-z$, $a+b-z$, and the corresponding equation is $z^2-3a+b z+a^2=0$.

Of the first of these equations it may be observed, that whatever be the value of $a$ and $b$, the square of $\frac{3a+b}{4}$, viz. of half the coefficient of $z$, is greater than $\frac{a^2}{4}$, and therefore the roots are always possible. If the square be completed, and the roots extracted, they become

$$z=\frac{3a+b}{2} \pm \frac{\sqrt{36+8b^2-a^2}}{2},$$

$$z=\frac{3a+b}{4} \pm \frac{\sqrt{36+8b^2-a^2}}{4}.$$  

But in this case $z$ is the least of the three terms, and therefore $a$ is greater than $2z$, or $\frac{a}{2}$ greater than $z$; and therefore the second root only can be admitted, and $z=\frac{3a+b}{4} \pm \frac{\sqrt{36+8b^2-a^2}}{4}$ is the only proper solution.

The second equation, since $a$ is greater than $b$, $\frac{3a-b}{4}$ must be always positive, and therefore the equation is necessarily of the third form. But the roots are possible only when $\frac{3a-b}{4}$ is not less than $\frac{a}{2}$ that is, when $a^2+b^2$ is not less than $6ab$, or when $a-b$ is not less than $2\sqrt{ab}$. When the roots are possible, $z$ may be either greater or less than $\frac{3a-b}{4}$, and hence each root gives a proper solution; therefore, $z=\frac{3a-b}{4} \pm \frac{\sqrt{36+8b^2-a^2}}{4}$.

Ex. Let $a=40$ and $b=6$. The first term in this case may be assumed either as the greatest or the least. And, first, if $z$ be the greatest; the roots of the equation will be possible, since $(a^2+b^2)=1636$ is greater than $(6ab)=1440$. The two values of $z$ are 32 and 25, and the proportions are either 32, 8, 2, or 25, 15, 9. 2df, If $z$ be assumed the least of the proportions, the two roots of the equation are possible, but Equations, one of them only can be applied; which is 17.635 nearly, and the three proportions are 17.635, 22.365, and 28.365, nearly, the roots of the equation being incommensurate.

In like manner may the limitations of the other question abovementioned be ascertained.

The same would have been got, by substituting in the general theorem $w=\frac{z}{2}, a=3$, and $b=10$, or, if the least number had been called $z'$, the equation would not have had fractional exponents.

Examp. 15. To find two numbers, of which the product is 100, and the difference of their square roots 3.

Let the less be $x$, the greater is 100.

By question

$$x^2-3x-100=0$$

$$x^2-\sqrt{x}=3$$

$$x^2=3 \pm \sqrt{9}$$

$$x^2=9$$

$$x=\pm 3$$

If $x=3$, the other number is 25; and this is the proper solution, for $x$ was supposed to be the least. In this case, indeed, the negative root of the equation being applied according to the rules for negative quantities, gives a positive answer to the question; and if $x=25$, the other number is 4.

The same would have been got, by substituting in the general theorem $w=\frac{z}{2}, a=3$, and $b=10$, or, if the least number had been called $x'$, the equation would not have had fractional exponents.

Of Indeterminate Problems.

It was formerly observed (Chap III.), that if there are more unknown quantities in a question than equations.
ALGEBRA.

Part I.

1, or a number divisible by 4. Then \(\frac{z+v}{2}\) and \(\frac{z-v}{2}\) are the numbers sought.

For the product of two odd numbers is odd, and that of two even numbers is divisible by 4. Also, if \(z\) and \(v\) are both odd or both even, \(\frac{z+v}{2}\) and \(\frac{z-v}{2}\) must be integers.

Ex. 1. If \(z=27\), take \(v=1\), then \(z=27\); and the squares are 196 and 169. Or \(z\) may be 9 and \(v=3\), and then the squares are 36 and 9.

2. If \(z=12\), take \(v=2\), and \(v=6\); and the squares are 16 and 4.

Ex. 3. To find a sum of money in pounds and shillings, whose half is just its reverse.

Note. The reverse of a sum of money as 81. 12s. is 12l. 8s.

Let \(x\) be the pounds and \(y\) the shillings.

The sum required is \(20x+y\)

Its reverse is \(-20x+y\)

Therefore \(-\frac{20x+y}{2}=20x+y\)

\[x:y=(59:18:1)\]

In this equation there are two unknown quantities; and, in general, any two numbers of which the proportion is that of 13 to 6 will agree to it.

But, from the nature of this question, 13 and 6 are the only two that can give the proper answer, viz. 13l. 6s. for its reverse 6l. 13s. is just its half.

The ratio of \(x\) and \(y\) is expressed in the lowest integral terms by 13 and 6; any other expression of it, as the next greater 26 and 12, will not satisfy the problem, as 12l. 26s. is not a proper notation of money in pounds and shillings.

CHAP. VII.

Demonstrations of Theorems by Algebra.

ALGEBRA may be employed for the demonstration of theorems, with regard to all those quantities concerning which it may be used as an analysis; and from the general method of notation and reasoning, it possesses the same advantages in the one as in the other.

The three first sections of this chapter contain some of the most important properties of series which are of frequent use; and the last, miscellaneous examples of the properties of algebraical quantities and numbers.

I. Of Arithmetical Series.

Def. When a number of quantities increase or decrease by the same common difference, they form an arithmetical series.

Thus, \(a, a+d, a+2d, a+3d, \&c\), \(x\), \(-a\), \(-a-2d\), \&c.

Also, \(1, 2, 3, 4, 5, 6, \&c\) and \(8, 6, 4, 2, \&c\).

Prop. In an arithmetical series, the sum of the first and
Part I.

**ALGEBRA.**

**Prop. I.** The product of the extremes in a geometrical series is equal to the product of any two terms, equally distant from the extremes.

Let the first term be \( a \), the last \( l \), and \( b \) the common difference; then \( b+\ell \) will be the second, and \( x-b \) the last but one, &c.

Thus, \( a, a+b, a+2b, a+3b, a+4b, \&c. \)

It is plain, that the terms in the fame perpendicular rank are equally distant from the extremes; and that the sum of any two in it is \( a+x \), the sum of the first and last.

Cor. 1. Hence the sum of all the terms of an arithmetical series is equal to the sum of the first and last, taken half as often as there are terms.

Therefore if \( n \) be the number of terms, and \( s \) the

\[ s = \frac{a+b}{2} \cdot n. \]

If \( a = 0 \), then \( s = \frac{n^2}{2} \).

Cor. 2. The fame notation being understood, since any term in the series consists of \( a \), the first term, together with \( b \) taken as often as the number of terms preceding it, it follows, that \( x = a + b \cdot \frac{n-1}{2} \cdot b \), and hence \( s = \frac{2an+nb^2}{2} \) or by multiplication, \( s = \frac{2an+nb^2}{2} \).

Therefore from the first term, the common difference, and number of terms being given, the sum may be found.

Ex. Required the sum of 50 terms of the series 2, 4, 6, &c.

\[ s = \frac{2 \cdot 50 \cdot (50+1)}{2} = 2550. \]

Cor. 3. Of the first term, common difference, sum and number of terms, any three being given, the fourth may be found by resolving the preceding equation: \( a, b, t, \) and \( n \), being successively considered as the unknown quantity. In the three first cases the equation is simple, and in the last it is quadratic.

II. Of Geometrical Series

**Def.** When a number of quantities increase by the same multiplier, or decrease by the same divisor, they form a geometrical series. This common multiplier or divisor is called the common ratio.

Thus, \( a, ar, ar^2, \&c. \)

\[ a, \ \frac{a}{r}, \ \frac{a}{r^2}, \ \frac{a}{r^3}, \ \&c. \]

**Prop. II.** The sum of a geometrical series, when the first term is \( a \) and the last \( l \) is equal to the sum of \( l \) and \( a \) multiplied by the common ratio.

For, assuming the preceding notation of a series, it is plain, that

\[ \frac{a}{r} + \frac{a}{r^2} + \frac{a}{r^3} + \ldots = \frac{a}{r} + \frac{a}{r^2} + \frac{a}{r^3} + \ldots \]

Cor. 1. Therefore \( s \) being the sum of the series, \( \frac{s}{ar} = \frac{1}{a} \). And \( r = \frac{a}{s} \).

Hence \( r \) can be found from \( a, y, \) and \( r \); and any three of the four being given, the fourth may be found.

Cor. 2. Since the exponent of \( r \) in any term is equal to the number of terms preceding it; hence in the last term its exponent will be \( n-1 \); the last term, therefore, \( y = or \), and \( s = ar^{n-1} = \frac{ar^n}{r} \).

Hence in these four, \( s, a, r, n \), any three being given, the fourth may be found by the solution of equations. If \( n \) is not a small number, the cases of this problem will be most conveniently resolved by logarithms; and of such solutions there are examples in the appendix to this part.

Cor. 3. If the series decreases, and the number of terms is infinite; then, according to this notation, \( a \)

the least term will be \( 0 \), and \( s = \frac{ar^r}{r-1} \), a finite sum.

Ex. Required the sum of the series \( 1, \frac{1}{2}, \frac{1}{4}, \&c. \)

Here \( y = 1 \), and \( r = 2 \). Therefore \( s = \frac{1 \cdot 2^r}{r-1} = 2 \).

What are called in arithmetic repeating and circulating decimals, are truly geometrical decreasing series, and therefore may be summed by this rule.

Thus \( \frac{333}{10}, \&c. = \frac{3}{10} + \frac{2}{100} + \&c. \) is a geometrical series in which \( y = \frac{3}{10} \) and \( r = 10 \); therefore \( s = \frac{y}{r-1} = \frac{y}{r-1} \).

Thus, also \( \frac{2424}{33}, \&c. = \frac{8}{33} \) for here \( y = \frac{24}{100} \) and \( r = 100 \); therefore \( s = \frac{y}{100} = \frac{24}{100} \).

III. Of Infinite Series.

It was observed (Chap. I. and IV.), that in many cases, if the division and evolution of compound quantities be actually performed, the quotients and roots can only be expressed by a series of terms, which may be continued ad infinitum. By comparing a few of the first terms, the law of the progression of such a series
Theorem. Any binomial \((a+b)\) may be raised to any power \((n)\) by the following rules.

1. From inspecting a table of the powers of a binomial obtained by multiplication, it appears that the terms without their coefficients, are \(a^n, a^{n-1}b, a^{n-2}b^2, \ldots\) This is the celebrated binomial theorem deduced here by demonstration, though upon evolvement, and devolution, fractional, positive, or negative; hence the signs of the terms of the \(n\)th term is \(\pm a^{n-1}b^{n-1}, \pm a^{n-2}b^{n-2}, \ldots, \pm a^{n-n}b^n, \pm a^0b^n\), &c. This is the celebrated binomial theorem. It is deduced here by induction only; but it may be rigidly demonstrated, though upon principles which do not belong to this place.

Cor. As \(m\) may denote any number, integral or fractional, positive or negative, hence the division, involution, and evolution, of a binomial, may be performed by this theorem.

Ex. 1. Let \(m = \frac{1}{1-r}\), then \(a+br = a^r + \frac{a^{r+1}}{2} - b + \frac{a^{r+2}}{4} - \ldots\). This being applied to the extraction of the square root of \(a^r + x^r\) (by inferring \(a^{r/2}\) for \(a\) and \(x^{r/2}\) for \(x\)), the same series results as formerly. (Chap. IV.)

Ex. 2. If \(\frac{1}{1-r}\) is to be turned into an infinite series, since \(\frac{1}{1-r} = 1\times\frac{1}{1-r}\), let \(a = 1, b = -r, and m = -1\); and the same series will arise as was obtained by division (Chap. I).

In like manner \(\sqrt[n]{\frac{a^n}{r^n}} = (\sqrt[n]{r^{n-1}} + 2x\sqrt[n]{2x^2-2x+1})^{\frac{1}{n-1}}\) may be expressed by an infinite series, by supposing \(a = 2x^n, b = -2x^n, and m = -1\), and then multiplying that series by \(r^n\).

Cor. 2. This theorem is useful also in discovering the law of an infinite series produced by division or evolution. Thus, the series expressing the square root of \(a^2 + x^2\), consists of \(a, together with a series of fractions; in the numerators of which are the even powers of \(x\), and in the denominators the odd powers of \(a\). The numerical coefficients of the terms of the whole series, as deduced by the theorem, will be: \(1, 1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}\), &c.

Note. If the binomial is \(a - b\), the signs of the terms of any power are all positive; if it is \(a - b\), the alternate terms are negative, beginning at the second. This theorem may be applied to quantities the sum or difference of more than two parts, by supposing them distinguished into two, and then substituting for the powers of these compound parts their values, to be obtained also, if required, from the theorem. Thus, \(a + b + c = a^2 + ab + ac + b^2 + bc + ca + c^2\).

Scholium.

An infinite series may itself be multiplied or divided by another; it may be involved or evoluted; and various other operations may be performed upon it which are necessary in the higher parts of algebra. The methods for finding the sum depend upon other principles.

IV. Properties of Numbers.

Theor. I. The sum of two quantities multiplied by their difference is equal to the difference of their squares.

Let the quantities be represented by \(a\) and \(b\), then \(a + b \times a - b = a^2 - b^2\). as appears by performing the operation.

Cor. If \(a\) and \(b\) be any two quantities of which the sum may be denoted by \(s\), the difference by \(d\), and their product by \(p\), then the following propositions will be true.

1. \(a + b = s, a - b = d\)
2. \(a^2 - b^2 = 2p\)
3. \(a + b = s, a - b = d\)
4. \(a^2 + b^2 = 2p + d\)
5. \(a + b = s, a - b = d\)
6. \(a^2 - b^2 = 2p - d\)

It is unnecessary to express these propositions in words, and the demonstrations are very easy, by raising \(a + b\) to certain powers, and making proper substitutions.

Theor. II. The sum of any number of terms \((n)\) of the odd numbers \(1, 3, 5, \ldots\) beginning with \(1\), is equal to the square of that number \((n^2)\).

In the rule for summing an arithmetical series, let \(a = r, b = 2a, and n = n\), and the sum of this series will be \(\frac{2an + n^2}{n} = a + \frac{n^2}{n}\). Q. E. D.
Part I.

**Algebra.**

**Theor. III.** The difference of any two square numbers is equal to the sum of the two roots, together with twice the sum of the numbers in the natural scale between the two roots.

Let the one number be \( p \), and the other \( p+n \), the intermediate numbers are \( p-1, p-2, \ldots, p-n-1 \).

The difference of the squares of the given numbers is \( 2p+2n \); the sum of the two roots is \( 2p+r \), and twice the sum of the series \( p-1 + p-2 + \ldots + p+n-1 \) is (by Cor. 1. 3d Sect. of this Chap.) \( 2(2p+n-1) \), viz. the sum of the first and last multiplied by the number of terms, and it is plain that \( 2p+n+2p+n-1 = 2pn+n^2 \). Therefore, &c.

**Lem. 1.** Let \( r \) be any number, and \( n \) any integer, \( r-n \) is dividible by \( r-1 \).

The quotient will be \( r-n + r^{n-1} \), &c. till the index of \( r \) be 0, and then the last term of it will be 1; for if this series be multiplied by the divisor \( r-n \), it will produce the dividend \( r^n-1 \).

It will appear also by performing the division, and inferring for any number.

**Lem. 2.** Let \( r \) be any number, and \( n \) any integer odd number, \( r^n \) is dividible by \( r+1 \). Also, if \( n \) is any even number, \( r^n \) is dividible by \( r+1 \).

The quotient will be \( r^n + r^{n-1} \), &c. till the exponent of \( r \) be 0, and the last term of the quotient will be 1. It will appear also by performing the division, and inferring for any number.

**Theor. IV.** If from any number in the general scale now described, the sum of its digits be substratcled, the remainder is dividible by 9.

The number is \( a+b+c+d+e+\ldots \), &c. and the sum of the digits is \( a+c+e+\ldots \), &c. Subtracting the latter from the former, the remainder is \( b+d+f+\ldots \), &c. But, (by Lem. 1.) \( r^n-1 \) is divisible by \( r-1 \), whatever integer number \( r \) may be, and therefore any multiple of \( r-1 \) is also divisible by \( r-1 \); Hence each of the terms, \( b+c+\ldots \), &c. is divisible by \( r-1 \), and therefore the whole is divisible by \( r-1 \).

**Cor. 1.** Any number, the sum of whose digits is divisible by \( r-1 \), is itself divisible by \( r-1 \). Let the number be called \( N \), and the sum of the digits \( D \); then by this prop. \( N-D \) is divisible by \( r-1 \), and \( D \) supposed to be divisible by \( r-1 \) ; therefore it is plain that \( N \) must also be divisible by \( r-1 \).

**Cor. 2.** Any number, the sum of whose digits is divisible by an aliquot part of \( r-1 \), is also divisible by that aliquot part. For, let \( N \) and \( D \) denote as before; and since \( N-D \) (Theor. 4.) is divisible by \( r-1 \), it is also divisible by an aliquot part of \( r-1 \); but \( D \) is divisible by an aliquot part of \( r-1 \), therefore \( N \) is also divisible by that aliquot part.

**Theor. V.** In any number, if from the sum of the coefficients of the odd powers of \( r \) the sum of the coefficients of the even powers be subtracted, and the remainder added to the number itself, the sum will be dividible by \( r+1 \).

In the number \( a+b+c+d+e+\ldots \), &c. the sum of the coefficients of the odd powers of \( r \) is \( b+d+f+\ldots \), &c. If the latter sum be subtracted from the former, and the remainder added to the given number, it makes \( a+b+c+d+e+\ldots \), &c. But (by Lem. 1.) \( r^n-1 \), \( r^n+1 \), \( r^n+1 \), &c. are each dividible by \( r+1 \), and therefore any multiples of them are also dividible by \( r+1 \), hence the whole number is dividible by \( r+1 \).

**Cor. 1.** If the difference of the sum of the even digits, and the sum of the odd digits of any number be dividible by \( r+1 \), the number itself is dividible by \( r+1 \).

Let the sum of the even digits (that is, the coefficients of the even powers of \( r \)) be \( D \), the sum of the odd digits be \( d \), and the number be \( N \). Then by the theorem \( N+D-d \) is dividible by \( r+1 \), and it is supposed that \( D-d \) is dividible by \( r+1 \); therefore \( N \) is dividible by \( r+1 \).

**Cor. 2.** In like manner, if \( D-d \) is dividible by an aliquot part of \( r+1 \), the number itself is dividible by \( r+1 \).

**Cor. 3.** If a number want all the odd powers of \( r \), or if it want all the even powers of \( r \), and the sum of its digits be dividible by \( r+1 \), that number is dividible by \( r+1 \).

**Cor. 4.** In the common scale \( r+1=11 \), which therefore will have the properties mentioned in this theorem, and the corollaries. Thus, in the number 6934, the sum of the even digits is 7, the sum of the odd digits is 18, and the difference is 11, a number dividible by 11, the given number therefore (Cor. 1.) is dividible by 11; Thus also, the sum of the digits of 704308 is dividible by 11, and therefore the number is dividible by 11 (Cor. 3.)

**Scholium.**

These theorems relate to any scale whatever, and therefore the properties of \( r-1 \) in Theor. 4. would in a scale of eight belong to seven, and those in Theor. 5. to nine. If twelve was the root of the scale, the former properties would belong to eleven, and the latter to thirteen.

**Appendix to Part I.**

**Algebra** may be employed in expressing the relations of magnitude in general, and in reasoning with regard to them. It may be used in deducing not only the relations of number, but also those of extension, and hence those of every species of quantity expressible by numbers or extended magnitudes. In this appendix are mentioned some examples of its application to other parts of mathematics, to physics, and to...
the practical calculations of business. The principles and suppositions peculiar to these subjects, which are necessary in directing both the algebraical operations, and the conclusions to be drawn from them, are here alluded as just and proper.

1. Application of Algebra to Geometry.

Algebra has been successfully applied to almost every branch of mathematics; and the principles of these branches are often advantageously introduced into algebraical calculations.

The application of it to geometry has been the source of great improvement in both these sciences: on account of its extent and importance it is here omitted, and the principles of it are more particularly explained in the third part of these elements.

In this place shall be given an example of the use of logarithms in resolving certain algebraical questions.

Note. When logarithms are used, let \( \log \) denote the logarithm of any quantity before which it is placed.

Ex. To find the number of terms of a geometrical series, of which the sum is 511, the first term 1, and the common ratio \( r \).

From sect. 2. chap. 6. it appears that \( s = \frac{a(1 - r^n)}{1 - r} \), and in this problem, \( s, r, \) and \( a \) are given, and \( n \) is to be found. By reducing the equation \( r^n = \frac{1}{1 + s/a} \) and from the known property of logarithms \( n \log x = \log \frac{x^n}{a} \), we have

\[
\log n = \log \frac{1}{1 + s/a} - \log a.
\]

Here \( s = 511, a = 1, r = 2 \), and \( n = \frac{\log 1/0.512}{\log 2} \).

\[
\frac{2.7093700}{0.3010299} = 9.
\]

In like manner may any such equation be resolved, when the only unknown quantity is an exponent, and when it is the exponent only of one quantity.

Ex. 2. An equation of the following quadratic form \( a\sqrt{x} - b\sqrt{y} = c \) may be resolved by logarithms. \( \sqrt{x} \) by the logarithms of Chap. V. \( x^2 = b^2 - 4ac \). And then \( x \) is discovered in the same manner as in the preceding example. Thus, let \( a = 2, b = 10, c = 96 \), and the equation \( 2\sqrt{x} - 10\sqrt{y} = 96 \).

\[
\sqrt{x} = 12 \pm 8. \quad \text{If } 2x = 8 \text{ then } x = \frac{8}{2} = 3 \text{ and } 2 - \frac{3}{4} = 2.512 \text{ and } 2.512^2 = 6.31 \text{ is a true equation. If } 2x = 12 \text{ then } x = \frac{12}{2} = 6.3121813 = 3.5849 \text{, and this number being solved for } x \text{ in the given equation, by means of logarithms, will answer the conditions.}
\]

Ex. 3. The sum of 2000, has been out at interest for a certain time, and 500l. has been at interest double of that time, the whole arrear now due reckoning 4 per cent. compound interest, is 600l. What were the times?

By the rules in the third part of this appendix for compound interest, it is plain that if \( R = 1.04 \), and the time at which the 2000l. is at interest be \( x \), the arrear of it will be 2000\( x \). The arrear of the 500l. is 500\( x \), and hence 500\( x \)\( R \), and 2000\( x \)\( R \), is 6000. This

\[
R = 1.04, x = \frac{2}{l.04} = 17.67, \text{ nearly, that is, 17 years and 8 months nearly, and the double is } 35 \text{ years and } 4 \text{ months; which answer the conditions.}
\]

11. Application of Algebra to Physics.

Physical quantities which can be divided into parts, that have proportions to each other, the same as the proportions of lines to lines, or of numbers to numbers, may be expressed by lines and numbers, and therefore by algebraical quantities. Hence these mathematical notations may be considered as the measures of such physical quantities; they may be reagented upon according to the principles of algebra, and from such reagentings, new relations of the quantities which they represent may be discovered.

In those branches of natural philosophy, therefore, in which the circumstances of the phenomena can be properly expressed by numbers, or geometrical magnitudes, algebra may be employed, both in promoting the investigation of physical laws by experience, and also in deducing the necessary consequences of laws investigated and prefixed to be just.

It is to be observed likewise, that if various hypotheses be assumed concerning physical quantities, with regard to what takes place in nature, their consequences may be demonstratively deduced, and thus a science may be established, which may be properly called mathematical. The use of algebra in this science, which is sometimes called Theoretical Mechanics, is obvious from the principles already laid down.

In conducting these inquiries, it is to be observed, that, for the sake of brevity, the language of algebraical operation is often used with regard to physical quantities themselves; though it is always to be understood, that, in strict propriety, it can be applied only to the mathematical notations of these quantities.

Before illustrating this application of algebra by examples, it may be proper to explain a method of finding the proportion of variable quantities, and reasoning with regard to it, which is of general use in natural philosophy.

2. Of the Proportion of Variable Quantities.

Mathematical quantities are often so connected, that when the magnitude of one is varied, the magnitudes of the others are varied, according to a determined rule. Thus, if two straight lines, given in position, intersect each other, and, if a straight line, cutting both, moves parallel to itself, the two segments of the given lines between their intersection and the moving line, however varied, will always have the same proportion. Thus also, if an ordinate to the diameter of a parabola move parallel to itself, the absciss will be increased or diminished in proportion as the square of the ordinate is increased or diminished.

In like manner may algebraical quantities be connected. If \( x, y, z, \) &c. represent any variable quantities, while \( a, b, c \), represent such as are constant or invariable, then an equation containing two or more variable quantities, with any number of constant quantities, will exhibit a relation of variable quantities, similar to those already mentioned. Thus, if \( ax = by \), then \( x : y :: b : a \), that is, \( x \) has a constant proportion to \( y \),
EQUATIONS.

In whatever way these two quantities may be varied.

Likewise, if $xy = z$, then $ax = bx$, or $y : x = \frac{b}{a}$; that is, $y$ has a constant proportion to the reciprocal of $x$, or $y$ is increased in the same proportion as $x$ is diminished, and conversely. It is necessary to premise the following definitions.

Definitions.

Let there be any number of variable quantities, $X$, $Y$, $Z$, $V$, &c. connected in such a manner, that when $X$ becomes $x$, $Y$, $Z$, $V$, &c. become respectively $y$, $z$, $v$, &c. Then

1. If two variable quantities $X$ and $Y$ are so connected, that whatever be the values of $x$ and $y$, $X : Y = x : y$, this proportion is expressed thus, $X=YZ$, and $X$ is said to be directly as $Y$, or shortly, $X$ is said to be as $Y$. If, then $X=YZ$, and $X$ is said to be inversely as $Y$, and the conseqents by $z$, then $XZ = YZ$; and directly as $Y$.

2. If two variable quantities $X$ and $Y$ are so connected, that $X : x = y : y$, or $X : x = \frac{1}{y} : \frac{1}{y}$, their relation is thus expressed, $X=\frac{1}{y}$; and $X$ is said to be inversely, or reciprocally as $Y$.

3. If $X$, $Y$, $Z$, are three variable quantities, so connected that $X : x = y : y$, their relation is expressed, $X=YZ$, and $X$ is said to be directly as $Y$ and $Z$, jointly; or $X$ is said to be as $Y$ and $Z$.

4. If any number of variable quantities as $X$, $Y$, $Z$, $V$, &c. are so connected, that $XT : x = YZ : \frac{V}{y}$, then $YT = \frac{YZ}{y}$, and $XY$ is said to be directly as $YZ$.

5. Let the preceding notation of proportion be called a proportional equation ($A$), the equation formerly treated of in this place, for the sake of distinction, called absolute.

Cor. Every absolute equation, containing more than one variable quantity, may be considered as a proportional equation; and in a proportional equation, if at any particular corresponding values of the variable quantities, the equation becomes absolute, it will be universally absolute.

Prop. If one side of a proportional equation be either multiplied or divided by any constant quantity, it will continue to be true. Thus, if $X=\frac{1}{y}$, then $\frac{a}{b}X=\frac{a}{b}\frac{1}{y}$.
Cor. 2. If two proportional equations have a common side, that side will be as the square root of the product of the other two. Thus if \(X=Y\), and \(Z=Z\) by this Prop. \(Y=XY\) and (Cor. 1) \(X=Z \cdot Z\). Hence also, in this case, \(\sqrt{X}=X \cdot Z\); for (Prop. 3) \(Y=X \cdot Z\).

Cor. 3. If one side of a proportional equation be a factor of a side of another proportional equation, the remaining side of the former may be inferred in the latter, in place of that factor. Thus, if \(X=YZ\), and \(Z=Z\), then \(X=Z\) as appears by multiplying the two equations, and dividing by \(Z\).

Prop. 5. Any proportional equation may be made absolute, by multiplying one side by a constant quantity.

Thus, if \(X=Y\), then let two particular corresponding values of these variable quantities be assumed as constant, and let them be \(a\) and \(b\), then \(X:a::Y:b\), and \(X \cdot a = Y \cdot b\), or \(X \cdot Y = a \cdot b\), an absolute equation.

Scholium.

1. If there are two variable physical quantities, either of the same, or of different kinds, which are so connected, that when the one is increased or diminished, the other is increased or diminished in the same proportion; or, if the magnitudes of the one, in any two situations, have the same ratio to each other, as the magnitudes of the other in the corresponding situations, the relation of the mathematical measure of these quantities may be expressed by a proportional equation, according to Def. 1.

2. If two variable physical quantities be so connected, that the one increases in the same proportion as the other is diminished, and conversely; or, if the magnitudes of the one, in any two situations, be reciprocally proportional to the magnitudes of the other, in the corresponding situations, the relation of their measures may be expressed by a proportional equation, according to Def. 2.

3. If three variable physical quantities are so connected, that one of them is increased or diminished, in proportion as both the others are increased or diminished; or, if the magnitudes of one of them, in any two situations, have a ratio which is compounded of the ratios of the magnitudes of the other two, in the corresponding situations; the relation of the measures of these three may be expressed by a proportional equation, according to Def. 3.

4. In like manner may the relations of other combinations of physical quantities be expressed according to Def. 4. And when these proportional equations are obtained, by reasoning with regard to them, according to the preceding propositions, new relations of the physical quantities may be deduced.

2. Examples of Physical Problems.

The use of algebra, in natural philosophy, may be properly illustrated by some examples of physical problems. The solution of such problems must be derived from known physical laws, which, though ultimately founded on experience, are here assumed as principles, and reasoned upon mathematically. The experiments by which the principles are ascertained admit of various degrees of accuracy; and on the degree of physical accuracy in the principles will depend the physical accuracy of the conclusions mathematically deduced from them. If the principles are inaccurate, the conclusions must, in like manner, be inaccurate; and, if the limits of inaccuracy in the principles can be ascertained, the corresponding limits in the conclusions derived from them, may likewise be calculated.

Example 1. Let a glass tube, 30 inches (\(a\)) long, be filled with mercury, excepting 8 inches (\(b\)), and let it be inverted as in the Torricellian experiment, so that the 8 inches of common air may rise to the top. It is required to find at what height the mercury will remain suspended, the mercury in the barometer being at that time 28 inches (\(a\)) high.

The solution of this problem depends upon the following principles:

1. The pressure of the atmosphere is measured by the column of mercury in the barometer; and the elastic force of the air, in its natural state, which resists this pressure, is therefore measured by the same column.

2. In different states, the elastic force of the air is reciprocally as the spaces which it occupies.

3. In this experiment, the mercury which remains suspended in the tube, together with the elastic force of the air in the top of it, being a counterbalance to the pressure of the atmosphere, may therefore be expressed by the column of mercury in the barometer.

Let the mercury in the tube be \(x\) inches, the air in the top of it occupies now the space \(a-x\); it occupied formerly \(b\) inches, and its elastic force was \(a\) inches of mercury: Now, therefore, the force must be \(a-x:b:a\) inches. (2.) Therefore \((x-\frac{b}{a})=d\). This reduced, and putting \(a-x\) the equation is \(x-\frac{b}{a}=d\). This resolved gives \(x=m\sqrt{m^{2}+b-ad}\).

In numbers \(x=44\) or 14.

One of the roots 44 is plainly excluded in this case, and the other, 14, is the true answer. If the column of mercury \(x\), suspended in the tube, were a counterbalance to the pressure of the atmosphere, expressed by the height of the barometer \(d\), together with the measure of the elastic force of \(b\) inches of common air in the space \(a-x\), that is, if \(x+b=d\) or \(x-\frac{b}{a}=d\), the equation will be the same as before, and the root 44 would be the true answer. But the experiment in this question does not admit of such a supposition.

Example 2. The distance of the earth and moon (\(d\)), and their quantities of matter (\(t\), \(f\)), being given, to find the point of equal attraction between them. Let the distance of the point from the earth be \(x\); its distance from the moon will be therefore \(d-x\). But gravitation is as the matter directly, and as the square of the distance inversely; therefore the earth’s attraction is as \(t\); and the moon’s attraction as \(\frac{1}{d-x}\). But these are here equal; therefore,
ALGEBRA.

In the following theorems let \( p \) denote any principal sum of which \( x \) is the unit, \( t \) the time during which it bears interest, of which one year shall be the unit, \( r \) the rate of interest of \( x \) for one year, and let \( s \) be the amount of the principal sum \( p \) with its interest for the time \( t \) at the rate \( r \).

I. Of Simple Interest.

When the simple interest at the end of every year is supposed to be joined to the principal sum, and both to bear interest for the following year, money is said to bear compound interest. The same notation being used, let \( I + p = R \). Then \( I = pRt \).

For the simple interest of \( x \) in a year is \( r \), and the new principal sum therefore which bears interest during the second year is \( (1 + rt)R \); the interest of \( R \) for a year is \( rR \), and the amount of principal and interest at the end of the 2d year, is \( R + rR = Rx(1 + r) \). In like manner, at the end of the 3d year it is \( R^2 \), and for the sum \( p \) it is \( pR^2 \).

Cor. 1. Of these four \( p \), \( R \), \( t \), \( r \), any three being given, the fourth may be found. When \( r \) is not very small, the solution will be obtained most conveniently by logarithms. When \( R \) is known \( r \) may be found, and conversely.

Ex. If \( 500 \) has been at interest for 21 years, the whole arrear due, reckoning \( 4\% \) per cent. compound interest, is \( 1260.12 \) or \( 1260.25 \). In this case \( p = 500 \), \( R = 1.045 \) and \( t = 21 \), and \( R = 1260.12 \), and any one of these may be derived by the theorem from the others being known. Thus, to find \( R \); take \( R = R^2 \)

\[
\text{Sd. 2.} \quad \text{The present worth of a sum \( f \) in reversion, that is payable after a certain time \( t \), is found thus. Let the present worth be \( x \), then this money improved by compound interest during \( t \) produces \( xR \), which must be equal to \( f \), and if \( xR^2 = f \), \( x = \frac{f}{R^2} \).
\]

Cor. 3. The time in which a sum is doubled at compound interest will be found thus. \( pR = 2p \) and \( R = 2 \) and \( t = \frac{2}{7} \); thus, if the rate is 5 per cent. \( R = 2 \), and the time is \( \frac{2}{7} \).

III. Of Interest and Annuities.

The application of algebra to the calculation of interests and annuities, will furnish proper examples of its use in business. Algebra cannot determine the propriety or justice of the common suppositions on which these calculations are founded, but only the necessary conclusions resulting from them.

Note.

Many other suppositions might be made with regard to the improvement of money by compound interest. The interest might be supposed to be joined to the capital, and along with it to bear interest at the end of every
An annuity is a payment made annually for a certain term of years, and the chief problem with regard to it is, to determine its present worth. The supposition on which the solution proceeds is, that the money received by the payer, being improved by him in a certain manner during the continuance of the annuity, amounts to the same sum as the several payments received by the purchaser, improved in the same manner. The suppositions with regard to the improvements may be various. What is called the method of simple interest, in which simple interest only is reckoned upon the purchase-money, and simple interest on each annuity from the time of payment, is so manifestly unsatisfactory, as to be universally rejected; and the supposition which is now generally admitted in practice, is the highest improvement possible on both sides, viz. by compound interest. As the taking compound interest is prohibited by law, the realizing of this duped improvement requires punctual payment of interest, and therefore the interest in such calculations is usually made low. Even with this advantage, it can hardly be rendered effectual in its full extent; it is however universally acquiesced in, as the most proper foundation of general rules; and when peculiar circumstances require any different hypothesis, a suitable calculation may be made.

Let then the annuity be called $a$, and let $p$ be the present worth of it or purchase-money, $t$ the time of its continuance, and let the other letters denote as formerly.

The seller, by improving the price received $p$, at compound interest, at the time the annuity ceases, has $pRt$.

The purchaser is supposed to receive the first annuity $a$ at the end of the first year, which is improved by him for $t-1$ years; it becomes therefore (Th. 2.) $aR^{t-1}$.

He receives the $a$ th annuity at the end of the 2d year, and when improved $t-2$, it becomes $aR^{t-1}$. The third annuity becomes $aR^{t-1}$, &c.

The last annuity is simply $a$, therefore the whole amount of the improved annuities is the geometrical series $a+aR+aR^2$, &c. &c. $aR^{t-1}$. The sum of this series, by Chap. VI. Sect. 2., is $axR^{t-1}-1$.

But, from the nature of the problem, $pRt=axR^{t-1}$, and hence $p=axR^{t-1}$.

The same conclusion results from calculating the present worth of the several annuities, considered as sums payable in reversion.

Cor. 1. Of the four $p$, $a$, $R$, $t$, any three being given, the fourth may be found, by the solution of equations; $t$ is found easily by logarithms, $R$ or $r$ can be found only by resolving an affected equation of the $t$ order.

Cor. 2. If an annuity has been unpaid for the term $t$, the arrear, reckoning compound interest, will be $axR^{t-1}$. 

Cor. 3. The present worth of an annuity in reversion, that is to commence after a certain time ($a$), and then to continue $t$ years, is found by subtracting the present worth for $n$ years from the present worth for $n+t$ years, and then

$$p = a\frac{R^{t-1} - R^t}{Rk + a R^{t-2}}.$$ 

Also of $R$, $t$, $n$, $a$, $p$, any four being given, the fifth may be found.

Cor. 4. If the annuity is to continue for ever, then $R^{t-1}$ and $Rt$ may be considered as the same; and

$$p = a\frac{R^{t-1} - a}{R^t}.$$ 

Cor. 5. A perpetuity in reversion (by Cor. 3.) since $R^{t-1} = R$, is $p = aR^t$.

Prob. When 12 years of a lease of 21 were expired, a renewal for the same term was granted for 1000; 8 years are now expired, and for what sum must a corresponding renewal be made, reckoning 5 per cent, compound interest? From the first transaction the yearly profit must be deduced; and from this the proper fine in the second may be computed.

In the first bargain, an annuity in reversion for 12 years, to commence 9 years hence, was sold for 1000. The annuity will therefore be found by Cor. 3, in which all the quantities are given, but $a = 4\frac{r}{R}$.

and by inserting numbers, viz. $p = 1000$, $t = 12$, $n = 9$, $r = 0.05$, and $R = 1.05$; and working by logarithms $a = 175.029 = 175.117$.

Next, having found $a$, the second renewal is made by finding the present worth of the annuity $a$ in reversion, to commence 13 years hence, and to last 8 years. In the canon (Cor. 5.) infer for $a = 175.029$, and let $t = 12$, $n = 13$, and $r = 0.05$ as before, $p = 599.93 = 599.835$. The fine required.

As these computations often become troublesome, and are of frequent use, all the common cases are calculated in tables, from which the value of any annuity for any time, at any interest, may easily be found.

It is to be observed also, that the preceding rules are computed on the supposition of the annuities being paid yearly; and therefore, if they be supposed to be paid half yearly, or quarterly, the conclusions will be somewhat different, but they may be easily calculated on the preceding principles.

The calculations of life annuities, depend partly on the principles now explained, and partly on physical principles, from the probable duration of human life, as deduced from bills of mortality.
Of the General Properties and Resolutions of \textit{Equations} of all Orders:

\textbf{CHAPTER I}

Of the Origin and Composition of \textit{Equations}; and of the Signs and Coefficients of their Terms.

In order to resolve the higher orders of equations, and to investigate their general affections, it is proper first to consider their origin from the combination of inferior equations.

As it would be impossible to exhibit particular rules for the solution of every order of equations, their number being indefinite; there is a necessity of deducing rules from their general properties, which may be equally applicable to all.

In the application of algebra to certain subjects, and especially to geometry, there may be an opposition in the quantities, analogous to that of addition and subtraction, which may therefore be expressed by the signs + and -. Hence these signs may be understood by subtraction, to denote contrariety in general; and therefore, in this method of treating of equations, negative roots are admitted as well as positive. In many cases the negative will have a proper and determinate meaning; and when the equation relates to magnitude only, where contrariety cannot be supposed to exist, these roots are neglected, as in the case of quadratic equations formerly explained. There is besides this advantage in admitting negative roots, that both the properties of equations from which their resolution is obtained, and also those which are useful in the many extensive applications of algebra, become more simple and general, and are more easily deduced.

In this general method, all the terms of any equation are brought to one side, and the equation is expressed by making them equal to 0. Therefore, if a root of the equation be inferred instead of \((x)\) the unknown quantity, the positive terms will be equal to the negative, and the whole must be equal to 0.

Def. When any equation is put into this form, the term in which \((x)\) the unknown quantity, is of the highest power, is called the \textit{First} that in which the index of \(x\) is less by 1, is the \textit{Second}, and so on, till the last, into which the unknown quantity does not enter, and which is called the \textit{Absolute Term}.

Prop. I. If any number of equations be multiplied together, an equation will be produced, of which the dimension \((a)\) is equal to the sum of the dimensions of the equations multiplied.

If any number of simple equations be multiplied together, as \(x=c_0, x=b+c_0, x=c_0, \&c.\), it is obvious, that the product will be an equation of a dimension, containing as many units as there are simple equations. In like manner, if higher equations are multiplied together, as a cubic and a quadratic, one of the fifth order is produced, and so on.

\textit{Conversely.} An equation of any dimension is considered as compounded either of simple equations, or of others, such that the sum of their dimensions is equal to the dimension of the given one. By the resolution of equations these inferior equations are discovered, and by investigating the component simple equations, the roots of any higher equation are found.

Cor. 1. Any equation admits of as many solutions, or has as many roots as there are simple equations which compose it, that is, as there are units in the dimension of it.

Cor. 2. And conversely, no equation can have more roots than the units in its dimension.

Cor. 3. Imaginary or impossible roots must enter an equation by pairs; for they arise from quadratics, in which both the roots are such.

Hence also, an equation of an even dimension may have all its roots, or any even number of them impossible, but an equation of an odd dimension must at least have one possible root.

Cor. 4. The roots are either positive or negative, according as the roots of the simple equations, from which they are produced, are positive or negative.

Cor. 5. When one root of an equation is discovered, one of the simple equations is found, from which the given one is compounded. The given equation, therefore, being divided by this simple equation, will give an equation of a dimension lower by 1. Thus, any equation may be deprefed as many degrees as there are roots found by any method whatever.

\textit{Prop. II.} To explain the general properties of the signs and coefficients of the terms of an equation.

Let \(x=c_0, x=b+c_0, x=-d+c_0, \&c.\) be simple equations, of which the roots are any positive quantities \(+a, +b, +c, +d, \&c.\) and let \(x=-m+c_0, x=-n+c_0, \&c.\) be simple equations, of which the roots are any negative quantities \(-m, -n, \&c.\) and let any number of these equations be multiplied together, as in the following table:

\[\begin{align*}
x & = c_0 \\
x + b & = c_0 \\
x - d & = c_0 \\
x + m & = c_0, \quad x + n & = c_0, \\
x + a & = c_0 \\
x + bx + ax & = c_0 \\
x + bx + ab & = c_0, \quad \text{a Quadratic.} \\
x + c & = c_0 \\
\end{align*}\]

\(\text{(*) The term \textit{dimension}, in this treatise, is used in senses somewhat different, but so as not to create any ambiguity. In this chapter it means either the order of an equation, or the number denoting that order, which was formerly defined to be the highest exponent of the unknown quantity in any term of the equation.}\)
CHAP. II.

Of the Transformation of Equations.

There are certain transformations of equations necessary towards their solution; and the most useful are contained in the following propositions.

Prop. 1. The affirmative roots of an equation become negative, and the negative become affirmative, by changing the signs of the alternate terms, beginning with the second.

Thus the roots of the equation \( x^4 - x^3 - 7x^2 + 49x = 0 \) are +1, -3, 2, -5, whereas the roots of the equation \( x^4 + x^3 - 19x^2 - 49x - 250 = 0 \), are -1, -3, 2, -5.

The reason of this is derived from the composition of the coefficients of these terms, which consist of combinations of odd numbers of the roots, as explained in the preceding Chapter.

Prop. 2. An equation may be transformed into another that shall have its roots greater or less than the roots of the given equation by some given difference.

Let \( x \) be the unknown quantity of the equation, and \( e \) the given difference; let \( \frac{x + e}{x - e} = \frac{A}{B} \), and if for \( x \) and its power in the given equation, \( y = e \), and its powers be inverted, a new equation will arise, in which the unknown quantity is \( y \), and its value will be \( x - e \); that is, its roots will differ from the roots of the given equation by \( e \).

Let the equation proposed be \( x^3 - px^2 + qx - r = 0 \), of which the roots must be diminished by \( e \). By inverting for \( x \) and its powers \( x + e \) and its powers, the equation required is,

\[
\left( x + e \right)^3 - p\left( x + e \right)^2 + q\left( x + e \right) - r = 0
\]

**Cor. 1.** From this transformation, the second, or any other intermediate term, \( m \) may be taken away; granting the resolution of equations.

Since the coefficients of all the terms of the transformed equation, except the first, involve the powers of \( e \) and known quantities only, by putting the coefficient of any term equal to \( 0 \), and resolving that equation, a value of \( e \) may be determined; which being substituted, will make that term to vanish.

Thus, in this example, to take away the second term, let its coefficient, \( 3x - 50x \), and \( e = 4 \), which being substituted for \( e \), the new equation will want the second term. And universally, the coefficient of the first term of a cubic equation being \( x \), and \( x \) being the unknown quantity, the second term may be taken away by supposing \( x = y - m \), then \( x + m \) being the coefficient of that term.

**Cor. 2.** The second term may be taken away by the solution of a simple equation, the third by the solution of a quadratic, and so on.

**Cor. 3.** If the second term of a quadratic equation, be taken away, it will become a pure equation, and thus a solution of quadratics will be obtained, which coincides with the solution already given in Part I.

**Cor. 4.** The last term of the transformed equation is the same with the given equation, only having \( e \) in place of \( x \).

**Prop. 3.** In like manner may an equation be transformed into another, of which the roots shall be equal to the roots of the given equation, multiplied or divided by a given quantity.

Let \( x \) be the unknown letter in the given equation, and \( y \) that of the equation wanted; also let \( e \) be the given quantity.

To multiply the roots let \( xe = y \) and \( xe = ye \).

To divide the roots let \( \frac{x}{e} = y \) and \( xe = ye \). Then...
Part II.  

**ALGEBRA.**

Of Equations. 

Then substitute for \( x \) and its powers, \( y \) or \( y \) and its powers, and the new equation of which \( y \) is the unknown quantity will have the property required.

Cor. 1. By this proposition an equation, in which the coefficient of the first term is any known quantity, as \( a \), may be transformed into another, in which the coefficient of the first term shall be unit. Thus, let the equation be \( ax^1 + px + qy + r = 0 \). Suppose \( y = ax \), or \( x = \frac{y}{a} \), and for \( x \) and its powers insert \( \frac{y}{a} \) and its powers, and the equation becomes

\[ \frac{y}{a} \left( \frac{y}{a} + p \right) + qy + r = 0 \]

Corollary 1. Let the second term of the given equation be \( ax^1 + px + qy + r = 0 \); and if \( x = \frac{y}{a} \), then \( y = \frac{ax^1}{a} + \frac{px}{a} + qy + r = a^2 \). Also, let the equation be \( ax^1 - 6x + 7x - 30 = 0 \); and if \( x = \frac{y}{a} \), then \( y = \frac{ax^1}{a} - 6y + 7y = a^2 \). Cor. 2. If the two transformations in Prop. 2. and 3. be both required, they may be performed either separately or together.

Thus, if it is required to transform the equation \( ax^1 + px + qy + r = 0 \) into one which shall want the second term, and in which the coefficient of the first term shall be \( x \); let \( x = \frac{y}{a} \) and then \( x = \frac{ax^1}{a} + \frac{px}{a} + \frac{qy}{a} + \frac{r}{a} = a^2 \).

Cor. 3. If there are fractions in an equation, they may be taken away by multiplying the equation by the denominators, and by this proposition the equation may then be transformed into another, without fractions, in which the coefficient of the first term is \( x \). In like manner may a fourth coefficient be taken away in certain cases.

Cor. 4. Hence alfo, if the coefficient of the second term of a cubic equation is not divisible by \( 3 \), the fractions thence arising in the transformed equation, wanting the second term, may be taken away by the preceding corollary. But the second term also may be taken away, so that there shall be no such fractions in the transformed equation, by supposing \( x = \frac{z}{3} \), being the coefficient of the second term of the given equation. And if the equation \( ax^1 + px + qy + r = 0 \) be given, in which \( p \) is not divisible by \( 3 \), by supposing \( x = \frac{z}{3} \), the transformed equation reduced is \( z^1 + \frac{2}{3}z^2 + \frac{4}{9}z^3 + \frac{2}{27}r = 0 \), wanting the second term, having one for the coefficient of the first term, and the coefficients of the other terms being all integers, the coefficients of the given equation being also supposed integers.

**General Corollary to Prop. 1. 2. 3.**

If the roots of any of these transformed equations be found by any method, the roots of the original equation, from which they were derived, will easily be found from the simple equations expressing their relation. Thus, if \( 8 \) is found to be a root of the transformed equation \( z^1 + 3z^2 - 60z = 0 \) (Cor. 2. prop. 3.), since \( x = \frac{z}{3} \), the corresponding root of the given equation \( 5x^1 - 6x^2 + 7x - 30 = 0 \) must be \( \frac{8}{3} + 2 = 2 \). It is to be observed also, that the reasoning in Prop. 2. and 3. and the corollaries, may be extended to any order of equations, though in them it is applied chiefly to cubic.

**CHAPTER III.**

Of the Resolution of Equations.

From the preceding principles and operations, rules may be derived for resolving equations of all orders.

I. **CARDAN'S RULE FOR CUBIC EQUATION.**

The second term of a cubic equation being taken away, and the coefficient of the first term being made \( 1 \), (by Cor. 1. Prop. 2. and Cor. 1. Prop. 3. Chap. II.), it may be generally represented by \( x^1 + 3x^2 + 3x + 1 = 0 \); the index + in all terms denoting the addition of them, with their proper signs. Let \( x = m + n \), and also \( mn = -q \); by the substitution of these values, an equation of the 6th order, but of the quadratic form, is deduced, which gives the values of \( m \) and \( n \); and hence,

\[ (m + n)^2 = x = \sqrt{-r + \sqrt{r^2 + q^3}} + \sqrt{-r - \sqrt{r^2 + q^3}}; \]

or \( x = \sqrt{-r + \sqrt{r^2 + q^3}} + \sqrt{-r - \sqrt{r^2 + q^3}} \).

Cor. 1. In the given equation, if \( 3y \) is negative, and if \( r \) is less than \( q^2 \), this expression of the root involves impossible roots; while, at the same time, all the roots of that equation are possible. The reason is, that in this method of solution it is necessary to suppose that \( x \) the root may be divided into two parts, of which the product is \( q \). But it is easy to show, that in this, which is called the irreducible case, it cannot be done.

For example, the equation (Ex. 3. Sect. 3. of this Chapter), \( x^1 - 1564 + 5600 \), belongs to the irreducible case, and the three roots are \( +4, +10 \), and all of these roots can be divided into two parts \( (m \) and \( n \) \), of which the product can be equal to \( \frac{1564}{3} = 52 \), for the greatest product from the division of the greatest root \(-14 \), is \( -7x = -52 \) less than 52.

If the cubic root of the compound sum can be extracted, the impossible parts balance each other, and the true root is obtained.

The geometrical problem of the trisection of an arch
Rule 1. All the terms of the equation being brought to one side, find all the divisors of the absolute term, and substitute them successively in the equation for the unknown quantity. That divisor which, substituted in this manner, gives the result \( \neq 0 \), shall be a root of the equation. 

\[
Ex. 1. \quad x^3 - 2ax^2 + 2a^2x - 2a^3b = 0.
\]

The simple literal divisors of \(-2ab\) are \(a, b, 2a, 3b\), any of which may be inferred for \(x\). Supposing \(x = a\), the equation becomes 

\[
x^3 - 2ax^2 + 2a^2x - 2a^3b = -3a^3 + 3ab^2
\]

which is obviously \(= 0\).

\[
Ex. 2. \quad x^3 - 2x^2 - 33x + 90 = 0.
\]

The operation is thus:

<table>
<thead>
<tr>
<th>Suppose,</th>
<th>Result</th>
<th>Divisors</th>
</tr>
</thead>
<tbody>
<tr>
<td>(x = 3)</td>
<td>-5</td>
<td>3, 2, 1</td>
</tr>
<tr>
<td>(x = 0)</td>
<td>90</td>
<td>9, 10</td>
</tr>
<tr>
<td>(x = -1)</td>
<td>-262</td>
<td>13, 19, 1</td>
</tr>
</tbody>
</table>

In this example there is only one progression, 4, 5, 2; and therefore 3 is a root, and it is \(-3\), since the series decreases.

It is evident by the rules for transforming equations (Chap. II.), that by inferring for \(x\), \(1\) \((= a)\) the result is the absolute term of an equation of which the roots are less than the roots of the given equation by \(1\) \((= x)\). Cor. 4. Prop. 2. When \(x = 0\) the result is the absolute term of the given equation. When for \(x\) is inferred \(-1\) \((= r)\) the result is the absolute term of an equation whose roots exceed the roots of the given equation by \(1\) \((= x)\). Hence, if the terms, of the series \(1, 0, -1, -2, \&c\), be inferred successively for \(x\), the results will be the absolute terms of so many equations, of which the roots form an increasing arithmetical feries with the difference \(1\). But as the commensurate roots of these equations must be among the divisors of their absolute terms, hence they must be among the arithmetical progressions found by this rule. The roots of the given equation therefore are to be sought for among the terms of these progressions which are divisors of the result, upon the supposition of \(x = 0\), because that result is its absolute term.

It is plain that the progressions must always be increasing, only it is to be observed, that a decreasing series with the sign \(+\) becomes increasing with the sign \(-\). Thus, in the preceding example, \(-4, -3, -2\), is an increasing series, of which \(-3\) is to be tried, and it succeeds.

If, from the substitution of three terms of the progression, \(1, 0, -1, \&c\), there arise a number of arithmetical feries. by substituting more terms of that progression, some of the feries will break off, and, of course, fewer trials will be necessary.

### III. Examples of Questions producing the higher Equations.

**Examp. 1.** It is required to divide 161. between two persons, so that the cube of the one’s share may exceed the cube of the other’s by 386.

Let the greater share be \(x\) pounds, and the less be \(16-x\).

By the question, \(x^3 - 16 - x^3 = 386\)

And by Inv. \(2x^3 - 48x^2 + 768x - 4096 = 386\)

Transp. and divide \(x^3 - 224x^2 + 38x - 2241 = 0\).

<table>
<thead>
<tr>
<th>Suppose,</th>
<th>Result</th>
<th>Divisors</th>
</tr>
</thead>
<tbody>
<tr>
<td>(x = 1)</td>
<td>-1880</td>
<td>1, 2, 5, 8, 10, 20</td>
</tr>
<tr>
<td>(x = 0)</td>
<td>-2241</td>
<td>1, 3, 5, 7, 8, 9</td>
</tr>
<tr>
<td>(x = -1)</td>
<td>-2650</td>
<td>1, 2, 5, 10, 25, 53</td>
</tr>
</tbody>
</table>

Where 8, 9, 10, differ by \(1\); therefore \(x = 9\) to be tried; and being inferred for \(x\), the equation is \(= 0\). The two shares then are 9 and 7 which succeed.

Since
Part II.

ALGEBRA.

Of Equations.

Since \( x = 9 \); \( x = 9 \) is one of the simple equations from which this cubic is produced, therefore

\[
x^3 - 24x^2 + 384x - 2241 = 0.
\]

And the two roots of this quadratic are impossible.

Example 2. What two numbers are those whose product multiplied by the greater will produce 495, and the difference multiplied by the lesser be 20?

Let the greater number be \( x \) and the lesser \( y \).

Then by quest.

\[
\begin{align*}
\frac{(x+y)(x-y)}{x} &= 495 \\
\frac{(x-y)}{x} &= 20
\end{align*}
\]

Therefore

\[
x = \frac{495 + 420y}{y} + 400
\]

Also

\[
x = \frac{405}{y},
\]

Therefore

\[
x^2 + 40y^2 + 400 = 405.
\]

This cubic equation has one positive incommensurate root, viz. \( 11.14 \), &c., which may be found by the rule in the next section, and two incommensurate roots \( y = 11.14 \), &c., which gives \( x = 19.067 \), &c., and these two answer the conditions very nearly.

Example 3. The sum of the squares of two numbers is 208, and the sum of their cubes 2240 being given, to find them.

Let the greater be \( x+y \), and the lesser \( x-y \).

Then

\[
x^2 + y^2 + 2xy = 208
\]

Hence

\[
y = 104 - x
\]

Also

\[
x + y = 2x^2 + 6xy = 2240
\]

Substitute \( y \) its value and \( 2x^2 + 6xy = 2240 \),

This reduces gives

\[
x^2 = 156x + 560 = 0
\]

The roots of this equation are \( + 10 \), \( + 14 \), \( - 14 \). If \( x = 10 \), then \( y = 2 \); and the numbers sought are 12 and 8, which give the only just solution. If \( x = 4 \), then \( y = 38 \) and \( y = \sqrt{88} \). The numbers sought are therefore \( 4 + \sqrt{88} \) and \( 4 - \sqrt{88} \). The last is negative, but they answer the conditions. Lastly, if \( x = -14 \), then \( y = 92 \), hence \( y = \sqrt{92} \), is impossible; but still the two numbers \( -14 + \sqrt{92} \), \( -14 - \sqrt{92} \), being inferred, would answer the conditions. But it has been frequently observed, that such solutions are both useless and without meaning.

IV. Solution of Equations by Approximation.

By the former rules, the roots of equations, when they are incommensurate may be obtained. These, however, more rarely occur; and when they are incommensurate, we can find only an approximate value of them, but to any degree of exactness required. There are various rules for this purpose; one of the most simple is that of Sir Isaac Newton, which shall be now explained.

Volume I.

Lemma. If any two numbers, being inferred for the unknown quantity \( x \) in any equation, give results with opposite signs, an odd number of roots must be between these numbers.

This appears from the property of the absolute term, and from this obvious maxim, that if a number of quantities be multiplied together, and if the signs of an odd number of them be changed, the sign of the product is changed. For, when a positive quantity is inferred for \( x \), the result is the absolute term of an equation whose roots are less than the roots of the given equation by that quantity (Prop. 2. Cor. 3. Chap. II.) If the result has the same sign as the given absolute term, then from the property of the absolute term (Prop. 2. Chap. I.) either none or an even number only of the positive roots, have had their signs changed by the transformation; but if the result has an opposite sign to that of the given absolute term, the signs of an odd number of the positive roots must have been changed. In the first case, then, the quantity substituted must have been either greater than each of an even number of the positive roots of the given equation, or less than any of them; in the second case, it must have been greater than each of an odd number of the positive roots. An odd number of the positive roots, therefore, must lie between them when they give results with opposite signs. The same observation is to be extended to the substitution of negative quantities and the negative roots.

From this lemma, by means of trials, it will not be difficult to find the nearest integer to a root of a given numerical equation. This is the first step towards the approximation; and both the manner of continuing it, and the reason of the operation, will be evident from the following example.

Let the equation be \( x^3 - 2x - 5 = 0 \).

1. Find the nearest integer to the root. In this case a root is between 2 and 3; for these numbers being inferred for \( x \), the one gives a positive, and the other a negative, result. Either the number above the root, or that below it, may be assumed as the first value; only it will be more convenient to take that which appears to be nearest to the root, as will be manifest from the nature of the operation.

2. Suppose \( x = 2 + f \), and substitute this value of \( x \) in the equation.

\[
x^3 - 2x - 5 = 14 + 6f + 4f + \frac{4f}{3} = 0.
\]

As \( f \) is less than unit, its powers \( f^2 \) and \( f^3 \) may be neglected in this first approximation, and \( f = 0.1 \) nearly, therefore \( x = 2.1 \) nearly.

3. As \( f = 0.1 \) nearly, let \( f = 1 + g \), and infer this value of \( f \) in the preceding equation.

\[
f^3 = 0.001 + 0.03g + 0.3g^3 + 6g^3
\]

\[
f^2 = 0.06 + 1.2g + 6g^3
\]

\[
f = 1 + 10g
\]

\[
f + 6f + 10f = 0.061 + 11.2g + 6.3g^3 + g^3 = 0.
\]

and neglecting \( g^3 \) and \( g^3 \) as very small \( 0.01 + 11.2g \)

\( f = 0 \).
In the same manner may the root of a pure equation be found, and this gives an easy method of approximating to the roots of numbers which are not perfect powers.

This rule is applicable to numerical equations of every order; and, by affining a general equation, general rules may be deduced for approximating to the roots of any proposed equation. By a similar method we may approximate to the roots of literal equations, which will be expressed by infinite series.

PART III.

Of the Application of Algebra to Geometry.

CHAP. I.

General Principles.

Geometry has been rendered far more extensive and useful, and algebra itself has received considerable improvements.

I. Of the Algebraical Expression of Geometrical Magnitudes.

A line, whether known or unknown, is represented by a single letter: a rectangle is properly expressed by the product of the two letters representing its sides: and a rectangular parallelopiped by the product of three letters; two of which represent the sides of any of its rectangular bases, and the third the altitude.

These are the most simple expressions of geometrical magnitudes; and any other which has a known proportion to these, may in like manner be expressed algebraically. Conversely, the geometrical magnitudes, represented by such algebraical quantities, may be found, only the algebraical dimensions above the third, not having any corresponding geometrical dimensions, must be expressed by proportionals (a).

The opposite position of straight lines may be expressed by the signs + and — . But, in order to express the various other positions of geometrical figures by algebra from the principles of geometry, some relations of magnitude must be found, which depend upon these positions, and which can be exhibited by equations: And, conversely, by the same principles may the positions of figures be inferred from the equations denoting such relations of their parts.

Though this application of algebra appears to be indirect, yet such is the simplicity of the operations, and the general nature of its theorems, that investigations, especially in the higher parts of geometry, are generally easier and more expeditious by the algebraical method, though less elegant than by what is purely geometrical. The connections also, and analogies of the two sciences established by this application, have given rise to many curious speculations.

Thus, let a point A be given in the line

\[ \overline{PA} \quad \overline{AM} \quad \overline{MP} \quad \overline{PB} \]

AP, any segment AP taken to the right hand being considered as positive, a segment AP to the left is properly

(a) All algebraical dimensions above the third must be expressed by inferior geometrical dimensions; and though any algebraical quantities of two or three dimensions may be immediately expressed by surfaces and solids respectively, yet it is generally necessary to express them, and all superior dimensions, by lines.

If, in any geometrical investigation by algebra, each line is expressed by a single letter, and each surface or solid by an algebraical quantity of two or three dimensions respectively, then whatever legitimate operations are performed with regard to them, the terms in any equation derived will, when properly reduced, be all of the same dimension; and any such equation may be easily expressed geometrically by means or proportionals, as in the following example.

Thus, if the algebraical equation \( a^4 + b^4 = c^4 - d^4 \), is to be expressed geometrically, \( a, b, c, d \), being supposed to represent straight lines; let \( a : b : c : d \), in continued proportion, the \( a^4 : b^4 : c^4 : d^4 \); and \( a^4 + b^4 : a^4 + b^4 : c^4 + d^4 \), etc., etc.: also, let \( a : c : b : d \), etc., etc., etc.; and \( a^4 : b^4 : c^4 : d^4 \), etc., etc., etc.; and \( c : e : p^4 : a : b : c \), and combining the latter with this last found, \( c^4 : d^4 : a^4 + b^4 : e : f : x^2 : c^4 + d^4 \); therefore \( c^4 - d^4 = x^2 : c^2 + d^2 \), and

\( e : c^4 + d^4 : f : x^2 + c^4 + d^4 \), and

\( c : e : p^4 : a : b : c \).
Part III.

Applicable demonstrations of the 11th and 13th propositions of the 2d book of Euclid, require only the 47th of the 1. 11. The 25th and 26th of the 3d book require only the 3. 11. 11 and 47. 11.

From a few simple geometrical principles alone, a number of conclusions, with regard to figures, may be deduced by algebra; and to this in a great measure is owing the extensive use of this science in geometry. If other more remote geometrical principles are occasionally introduced, the algebraical calculations may be much abridged. The same is to be observed in the solution of problems; but such in general are less obvious, and more properly belong to the first geometrical method.

III. Of the Solution of Problems.

Upon the same principles are geometrical problems to be resolved. The problem is supposed to be constructed, and proper algebraical notations of the known and unknown magnitudes are to be sought for, by means of which their connections may be expressed by equations. It may first be remarked, as was done in the case of theorems, that in those problems which relate to the divisions of a line and the proportions of its parts, the expression of the quantities, and the solving their relations by equations, are so easy as not to require any particular directions. But when various positions of geometrical figures and their properties are introduced, the solution requires more attention and skill. No general rules can be given on this subject, but the following observations may be of use.

1. The construction of the problem being supposed, it is often farther necessary to produce some of the lines till they meet; to draw new lines joining remarkable points; to draw lines from such points perpendicular or parallel to other lines, and such other operations as seem conducive to the finding of equations; and for this purpose, those especially are to be employed which divide the scheme into triangles that are given, right angled or similar.

2. It is often convenient to denote by letters, not the quantities particularly sought, but some others from which they can easily be deduced. The same may be observed of given quantities.

3. The proper notation being made, the necessary equations are to be derived by the use of the most simple geometrical principles; such as the addition and subtraction of lines or of figures, the proportionality of lines, particularly of the sides of similar triangles, &c.

4. There must be as many independent equations as there are unknown quantities assumed in the investigation, and from these a final equation may be inferred by the rules of Part I.

If the final equation from the problem be resolved, the roots may often be exhibited geometrically; but the geometrical construction of problems may be effected.
Applying also without resolving the equation, and even without deducing a final equation, by the methods afterwards to be explained.

If the final equation is simple or quadratic, the roots being obtained by the common rules, may be geometrically exhibited by the finding of proportionals, and the addition or substraction of squares.

By inserting numbers for the unknown quantities, a numeral expression of the quantities sought will be obtained by resolving the equation. But in order to determine some particulars of the problem besides finding the unknown quantities of the equation it may be further necessary to make a simple construction; or, if it is required that everything be expressed in numbers, to substitute a new calculation in place of that construction.

**Prop. I. To divide a given straight line AB into two parts, so that the rectangle contained by the whole line and one of the parts may be equal to the square of the other part.**

This is prop. 11th B. of Eucl.

\[ \frac{AC}{BC} = \frac{p}{x} \]

Let C be the point of division, and let \( AB = a \), \( AC = x \), and then \( CB = a-x \). From the problem \( a^2 = px \cdot x^2 \); and this equation being resolved (Chap. V. P. II.) gives \( x = \sqrt{a^2 + a^2} \).

The quantity \( \sqrt{a^2 + a^2} \) is the hypotenuse of a right-angled triangle, of which the two sides are \( a \) and \( a \), and is therefore easily found; \( \frac{a}{2} \) being taken from \( \frac{a}{2} \) this line, gives \( x = AC \), which is the proper solution. But if a line \( AC \) be taken on the opposite side of \( A \), and equal to the abovementioned hypotenuse, together with \( a \), it will represent the negative root \(-\sqrt{a^2 + a^2} \).

\[ -\frac{a}{2} \] and will give another solution; for in this case also \( AB \times BC = AC^2 \). But \( C \) is without the line \( AB \); and therefore, if it is not considered as making a division of \( AB \), this negative root is rejected.

This solution coincides with what is given by Euclid. For \( \sqrt{a^2 + a^2} \) is equal (see the fig. of Prop. 11th Eucl. Simson’s edit.) to \( EB \) or \( EF \), and therefore \( x = \sqrt{a^2 + a^2} \) \( = EF = EA = AF = AH \); and

\[ \frac{4}{2} \] the point \( H \) corresponds to \( C \) in the preceding figure.

Besides, if on \( (EF + EA) = CF \) (instead of \( EF = EA = FA \) a square be described on the opposite side of \( CF \) from \( AG, BA \) produced will meet a side of it in a point; which if it be called \( K \), will give \( KB \times BA = KA \). \( K \) corresponds to \( C \), and this solution will correspond with the algebraical solution by means of the negative root.

If \( CB \) had been called \( x \), and \( AC = a-x \), the equation would be \( ax = a^2 - 2a \cdot x + x^2 \), which gives \( x = \frac{a^2 + a^2}{2} \), in which both roots are positive, and the solutions derived from them coincide with the proceeding. If the solution be confined to a point within the line, then one of these positive roots must be rejected, for one of the roots of the compound square from which it is derived, \( x = \frac{a}{2} \), is a negative quantity which in this strict hypothesis is not admitted. In such a problem, however, both constructions are generally received, and considered even as necessary to a complete solution of it.

If a solution in numbers be required, let \( AB = 10 \), \( AC = 6 \), \( BC \) and \( AD = 7 \), both of which are given because the triangle is given. Let \( AK \) be assumed as the unknown quantity, because from it the square can easily be constructed; and let it be called \( x \). Then \( (KD = EG) = EF = 2 \). On account of the parallels \( EF, BC, AD : BC : AK \times EF \); that is, \( p : a : x ; p-x \), and \( p + px = ax \), which equation being resolved, gives \( x = \frac{p}{x} \).

Therefore \( x \) or \( AK \) is a third proportional to \( p-a \) and \( p \), and may be found by \( 11 \). VI. El. The point \( K \) being found, the construction of the square is sufficiently obvious.

**Prop. III. In the right-angled Triangle ABC, the Base BC, and the Sum of the Perpendicular and Sides BA+AC+AD being given, to find the Triangle.**

Such parts of this triangle are to be found as are necessary for describing it: The perpendicular \( AD \) will be sufficient for this purpose; and let it be called \( x \). Let \( AB + AC + AD = a \), \( BC = b \); therefore \( BA + AC = a - x \). Let

\[ \frac{4}{2} \]
Part III.

Application to Geometry.

Let $BA - AC$ be denoted by $y$, then $BA = \frac{a + y - x}{2}$.

and $AC = \frac{a - x - y}{2}$. But [47. I. El.] $BC = BA + AC + AD = \frac{a + y - x}{2} + \frac{a - x - y}{2} + \frac{a - 2ax + x^2 + y^2}{2}$. Like-wise, from a known property of right-angled triangles, $BC \times AD = BA \times AC$; that is, $BC = \frac{a + y - x}{2}$.

This last equation being multiplied by 2, and added to the former, gives $b^2 + 2bx = a^2 - 2ax - x^2$, which being resolved according to the rules of Part I. Chap. V. gives $x = a + b - \sqrt{2ab + 2b^2}$.

To construct this: $a + b$ is the sum of the perimeter and perpendicular, and is given; $\sqrt{2ab + 2b^2} = \sqrt{a + b + 2b^2}$ is a mean proportional between $a + b$ and $b^2$, and may be found; therefore, from the sum of the perimeter and perpendicular subtract the mean proportional between the said sum and double the base and the remainder will be the perpendicular required.

From the base and perpendicular the right-angled triangle is easily constructed.

In numbers, let $BA + AC + AD = 18.8 = a$; $BC = 10 = b$; then $AD = 4.8 = \sqrt{2ab + 2b^2} = 18.8 - \sqrt{576} = 4.8 = x$, and $BA + AC = 14$. By either of the first equations $y = a^2 + 2ax - a^3 = 4$ and $y = BA - AC = 4$; therefore $BA = 8$, and $AC = 6$.

The geometrical expression of the roots of certain equations arising from problems may be found without resolving them by the intersection of geometrical lines. Thus, the roots of a quadratic are found by the intersections of the circle and straight line, those of a cubic and biquadratic, by the intersections of two conic sections, &c.

The solution of problems may be effected also by the intersections of the loci of two intermediate equations without deducing a final equation. But these two last methods can only be understood by the doctrine of the loci of equations.

CHAP. II.

Of the Definition of Lines by Equations.

Lines which can be mathematically treated of must be produced according to an uniform rule, which determines the position of every point of them. This rule constitutes the definition of any line from which all its other properties are to be derived. A straight line has been considered as so simple as to be incapable of definition. The curve lines here treated of are supposed to be in a plane; and are defined either from the section of a solid by a plane, or more universally by some continued motion in a plane, according to particular rules. Any of the properties apply which are shown to belong peculiarly to such a line, may be assumed also as the definition of it, from which all the others, and even what upon other occasions may have been considered as the primary definition, may be demonstrated. Hence lines may be defined in various methods, of which the most convenient is to be determined by the purpose in view. The simplicity of a definition, and the ease with which the other properties can be derived from it, generally give a preference.

Definitions. 1. When curve lines are defined by equations, they are supposed to be produced by the extremity of one straight line, as PM moving in a given angle along another straight line AB given in position, which is called the base.

2. The straight line PM moving along the other, is called an Ordinate, and is usually denoted by $y$.

3. The segment of the base AP between a given point in it A, and an ordinate PM, is called an Absciss with respect to that ordinate, and is denoted by $x$. The ordinate and absciss together are called Co-ordinates.

4. If the relation of the variable absciss and ordinate AP and PM, be expressed by an equation, which besides $x$ and $y$ contains only known quantities, the curve MO described by the extremity of the ordinate, moving along the base, is called the Locus of that equation.

5. If the equation is finite, the curve is called Algebraical (a). It is this class only which is here considered.

6. The dimensions of such equations are estimated from the highest sum of the exponents of $x$ and $y$ in any term. According to this definition, the terms $x^n$, $x^n y$, $x^m y^r$, $x y^r$, $y^r$ are all of the same dimension.

7. Curve lines are divided into orders from the dimensions of their equations, when bred from fractions and surds.

In these general definitions, the straight line is supposed to be comprehended, as it is the locus of simple equations. The loci of quadratic equations are shown to

(a) The terms Geometrical and Algebraical, as applied to curve lines, are used in different senses, by different writers; there are several other classes of curves besides what is here called algebraical, which can be treated of mathematically, and even by means of algebra. See Scholium at the end.
to be the conic sections, which are hence called lines of the second order, &c.

It is sufficiently plain from the nature of an equation, containing two variable quantities, that it may determine the position of every point of the curve, defined by it in the manner now described: for if any particular known value of one of the variable quantities as t be assumed, the equation will then have one unknown quantity only, and being resolved, will give a precise number of corresponding values of y, which determine so many points of the curve.

As every point of the locus of an equation has the same general property, it must be one curve only, and from this equation all its properties may be derived. It is plain also, that any curve line defined from the motion of a point, according to a fixed rule, must either return into itself, or be extended ad infinitum with a continued curvature.

The equation, however, is supposed to be irreducible; because, if it is not, the locus will be a combination of inferior lines: but the combination will possess the general properties of the lines of the order of the given equation.

It is necessary to be observed all along that the positive values of the ordinate, as PM, being taken upwards, the negative PM will be placed downwards, on the opposite side of the base: and if positive values of the abscissa, as AP, be assumed to the right from its beginning, the negative values, AP will be upon the left, and from these the points of the curve are to be determined.

In the general definition of curves it is usual to suppose the co-ordinates to be at right angles. If the locus of any equation be described, and if the abscissa be assumed on another base, and the ordinate be placed at a different angle, the new equation expressing their relation though of different form, will be of the same order as the original equation; and likewise will have, in common with it, those properties which distinguish the equations of that particular curve.

This method of defining curves by equations may not be the best for a full investigation of the properties of a particular curve; but as their number is without limit, such a minute inquiry concerning all, would be not only useless, but impossible. It has this great advantage, however, that many of the general affects of all curves, and of the different orders, and also some of the most useful properties of particular curves, may be easily derived from it.

1. The Determination of the Figure of a Curve from its Equations.

The general figure of the curve may be found by substituting successively particular values of x the abscissa, and finding by the resolution of these equations the corresponding values of y the ordinate, and of consequence so many points of the curve. If numeral values be substituted for x, and also certain numbers for the known letters, the resolution of the equation gives numerical expressions of the ordinates; and from these, by means of scales, a mechanical description of the curve will be obtained, which may often be useful, both in pointing out the general disposition of the figure, and also in the practical applications of geometry.
The portion between A and E is called a *Nodus*.

If $y$ be put $= 0$, then the values of $x$ are $o$, $o$, $b$.

That is, the curve passes twice through $A$, or $A$ is a punctum duplex, and it passes also through $E$ as before. (r.)

The mechanical description of curves mentioned in the beginning of this section, may be illustrated by the preceding example. For this purpose, let any numerical values of $x$ and $b$ be assumed; and if successive numerical values of $x$ be inferred, corresponding numerical values of $y$ will be obtained, by which so many points in the curve may be constructed. Let $AC = 10$; $AE = b = 12$; and, first let $x = 1$, then

$$y = x \sqrt{\frac{x + b}{a - x}} = \frac{\sqrt{13}}{3} = 1.2$$

nearly, which gives the length of the ordinates when the abscises is 1; and in the same manner the ordinates to be found when $x$ is 2, 3, or any other number. Thus, if $x = 6$,

$$y = 6 \times \frac{\sqrt{13}}{2} = 12.73$$

nearly; and if $AP$ be taken from the scale of equal parts (according to which $A B$ and $A E$ are supposed to be laid down) and equal to 6, then $PM$, $PM$, being taken from the same scale, each equal to 12.73, will give the points of the curve.

In like manner, if $x = y$, then $y = 9 \frac{\sqrt{3}}{19} = 3.58$ nearly; and if $AP = 9$, then $PM$, $PM$ being taken from the same scale equal to 3.58, will give the points $M$, $M$. In the same manner any number of points may be found, and these being joined, will give a representation of the curve, which will be more or less just, according to the number of points found, and the accuracy of the several operations employed.

By the same methods the locus of any other equation is to be traced. Thus, by varying the former equation, the figure of its locus will be varied. If $b = 0$, then the point $A$ and $E$ coincide, the nodus vanishes, and $A$ is called a *root*.

If $b$ is negative, then $E$ is to the right of $A$, which application will now be a punctum conjugation. The rest of the curve will be between $E$ and $C$ and $CD$ becomes an asymptote.

If $x = 0$ then $y = x \sqrt{\frac{x + b}{a - x}}$ or $y = bx - x^2$, which is an equation to the circle of which $b = AE$ is the diameter.

### II. General Properties of Curves from their Equations.

The general properties of equations lead to the general affections of curve lines. For example, A straight line may meet a curve in as many points as there are units in the dimension of its equation; so many roots may that equation have. An asymptote may cut a curve line in as many points, excepting two, as it has dimensions, and no more. The same may be observed of the tangent.

Impossible roots enter an equation by pairs; therefore the intersections of the ordinate and curve must vanish by pairs.

The curves of which the number expressing the order is odd, must have at least two infinite areas; for the abscises may be so assumed, that, for every value of it, either positive or negative, there must be at least one value of $y$, &c.

The properties of the coefficients of the terms of equations, mentioned Part II. Chap. I. furnish a great number of the curious and universal properties of curve lines. For example, the second term of an equation is the sum of the roots with the signs changed, and if the second term is wanting, the positive and negative roots must be equal. From this it is easy to demonstrate, That if each of two parallel straight lines meet a curve line in as many points as it has dimensions, and if a straight line cut these two parallels, so that the sum of the segments of each on one side be equal to the sum of the segments on the other, this straight line will cut any other line parallel to these in the same manner. Analogous properties, with many other consequences from them, may be deduced from the composition of the coefficients of the other terms.

Many properties of a particular order of curves may be inferred from the properties of equations of that order. Thus, If a straight line cut a curve of the third order in three points, and another straight line be drawn, making a given angle with the former, and cutting the curve also in three points, then the parallels by the segments of one of these lines between its intersection with the other, and the points where it meets the curve, will be to the parallels by the like segments of the other line in a given ratio. This depends upon the composition of the absolute term, and may be extended to curves of any order.

### III. *To* Subdivide *Con* of Curves.

As lines are divided into orders from the dimensions of their equations, in like manner, from the varieties of the equations of any order, may different genera and species of that order be distinguished, and from the peculiar properties of these varieties, may the affections of the particular curves be discovered.

For this purpose a complete general equation is assumed of that order, and all the varieties in the terms and coefficients which can affect the figure of the locus are enumerated.
It was formerly observed, that the equations belonging to any one curve, may be of various forms, according to the position of the base, and the angle which the ordinate makes with it, though they be all of the same order, and have also certain properties, which distinguish them from the other equations of that order.

The locus of simple equations is a straight line. There are three species of lines of the second order, which are easily shown to be the conic sections, reckoning the circle and ellipse to be one. Seventy-eight species have been numbered of the third order: And as the superior orders become too numerous to be particularly reckoned, it is usual only to divide them into certain general classes.

A complete arrangement of the curves of any order would furnish canons, by which the species of a curve whose equation is of that order might be found.

IV. Of the place of Curves defined from other principles in the Algebraical System.

If a curve line be defined from the section of a solid, or from any rule different from what has been here supposed, an equation to it may be derived, by which its order and species in the algebraical system may be found. And, for this purpose, any base and any angle of the co-ordinates may be assumed, from which the equation may be most easily derived, or may be of the most simple form.

The three Conic Sections are of the second order, as their equations are universally quadratic; the Circle of the ancients is of the third order, and the 42d species, according to Sir Isaac Newton's enumeration; this is the curve defined by the equation in page 439, col. i. par. ult., when $b=0$. The curve delineated above in the same page, is the 43d species. When $b$ is negative in that equation, the locus is the 43d species. The Conchoid of Nicomedes is of the fourth order; the Caffinian curve is also of the fourth order, &c.

It is to be observed, that not only the first definition of a curve may be expressed by an equation, but likewise any of those theorems called loci, in which some property is demonstrated to belong to every point of that curve. The expression of these propositions by equations, is sometimes difficult; no general rules can be given, and it must be left to the skill and experience of the learner.

Scholium.

This method of treating curve lines by equations, besides the uses already hinted at, has many others, which do not belong to this place; such are, the finding the tangents of curves, their curvature, their areas and lengths, &c. The solution of these problems has been accomplished by means of the equations to curves, though by employing, concerning them, a method of reasoning different from what has been here explained.

CHAP. III.

I. Construction of the Loci of Equations.

The description of a curve, according to the definition of it, is assumed in geometry as a postulate. If the properties of a particular curve are investigated, it will appear that it may be described from a variety of data different from those assumed in the postulate, by demonstrating the dependence of the former upon the latter.

As the definitions of a curve may be various, so also may be the postulates, and a definition is frequently chosen from the mode of description connected with it. The particular object in view, it was formerly remarked, must determine the proper choice of a definition; the simplicity of it, the ease with which the other properties of the figure may be derived from it, and sometimes even the ease with which it can be executed mechanically, may be considered as important circumstances.

In the straight line, the circle, the conic sections, and a few curves of the higher orders, the most convenient definitions, and the postulates connected with them, are generally known and received. An equation to a curve may also be assumed as a definition of it; and the description of it, according to that definition, may be considered as a postulate; but, if the geometrical construction of problems is to be investigated by means of algebra, it is often useful to deduce from the equation to a curve, those data which, from the geometrical theory of the curve, are known to be necessary to its description in the original postulate, or in any problem founded upon it. This is called Constructing the locus of an equation, and from this method are generally derived the most elegant constructions which can be obtained by the use of algebra. In the following section, there is an example of a problem resolved by such constructions.

Sometimes a mechanical description of a curve line defined by an equation is useful; and as the exhibition of it, by such a motion as is suggested in that definition, is rarely practicable, it generally becomes necessary to contrive some more simple motion which may in effect correspond with the other, and may describe the curve with the degree of accuracy which is wanted. Frequently, indeed, the only method which can be conveniently practised, is the finding a number of points in the curve by the resolution of numerical equations, in the manner mentioned in Sect. 1. of this Chapter, and then joining these points by the hand; and though this operation is manifestly imperfect, it is on some occasions useful.

II. Solution of Problems.

The solution of geometrical problems by algebra is much promoted, by describing the loci of the equations arising from these problems.

For this purpose, equations are to be derived according to the methods formerly described, and then to be reduced to two, containing each the same two unknown quantities. The loci of these equations are to be described, the two unknown quantities being considered as the co-ordinates, and placed at the same angle in both. The co-ordinates at the intersection of the loci, will be common to both, and give a solution of the problem.

The simplicity of a construction obtained by this method, will depend upon a proper notation, and the choice of the equations of which the loci are to be described. These will frequently be different from what would be proper in a different method of solution.
Part III.

A L G E B R A.

PROB. IV. To find Point P in the Base of the given Triangle ABC, so that the Sum of the Squares of FE, FD drawn from it perpendicular upon the two Sides, may be equal to a given Space.

Draw BH, CG perpendicular on the two sides, and let $FD = x$, $FE = y$.

Also $\frac{bh}{r} = \frac{z}{a}$, and $x = \frac{y}{b}$.

Therefore $\frac{bh}{a} = \frac{y}{b}$.

That is $y = \frac{bx}{r}$.

An equation to a straight line.

But $x^2 + y^2 = m^2$ of which the locus is a circle, having $m$ for the radius. By constructing these loci, their intersection will give a solution of the problem.

Let $KL = CG = \frac{r}{a}$ be at right angles to $LM = BH = \frac{z}{a}$, join $KM$, to which let $LK$ be parallel; $LN$ is the straight line of the equation $y = \frac{bx}{r}$; for let any line $OPQ$ be drawn parallel to $LM$, if $KP = x$, then $PQ = \frac{bx}{r}$.

And $OQ = LM = \frac{z}{a}$, therefore $OQ = y = \frac{bx}{r}$.

About the centre $K$, with a distance equal to the line $m$, let a circle be described; that circle will be the locus of the equation $m^2 = x^2 + y^2$; for it is plain that if $OP$ be any perpendicular from the circumference upon $KL$, $KP$ being $x$, $OP$ will be $y$. Either of the points, therefore, in which this two loci intersect each other, as $O$, will give $OP$ an ordinate in both equations, $KP$ being the common absciss; therefore $KP$, $OP$ are the two perpendiculars required, from which the point $F$ is easily found.

The construction might have been made on figure 18, with fewer lines. If the circle touches $LN$, there is only one solution which is a minimum; and if the circle does not meet $LN$, the problem becomes impossible.

When the circle touches $LN$, the radius $m$ must be equal to the perpendicular from $K$ on $LN$, or from $L$ Vol. 1.

PROB. V. Between two given Lines to find two mean Proportional.

Let the lines be $a$ and $b$, and let the two means be $x$ and $y$; therefore $ax = yb$, and hence $y = \frac{ax}{b}$, which are both equations to the parabola, and are easily constructed. The co-ordinates at the intersection of these two loci will be the means required.

If one unknown quantity only is assumed, or if it is convenient to deduce a final equation containing only one, the construction of the roots is to be obtained by the method mentioned in the next section.

Scholium.

The constructions of the two preceding problems are geometrical; but it is sometimes convenient to have a practical solution, by the mechanical description either of the algebraical lines employed in the geometrical solution, or of other geometrical lines by which it can be effected. But few of these are tolerably accurate; so that, in general, by means of calculation, the practical operations are all reduced to what may be performed by a ruler and a compas.

III. Construction of Equations.

The roots of an equation, containing only one unknown quantity, may be found by the intersection of lines, the product of whose dimensions is equal to the dimension of that equation. And hence problems are resolved without an algebraical solution of the equation arising from them.

Thus cubic and biquadratic equations may be constructed by the intersections of two conic sections as the circle and parabola, which are generally assumed as being most easily described.

In order to find these constructions, a new equation is to be assumed, containing two variable quantities, one of which is the unknown quantity of the given equation, and the other by substitution is to be inferred also in the given equation; the intersection of the loci of these equations will exhibit the roots required.

Canons may be devised for the construction of particular orders, without adumbrating the new equation.

The final equation from prob. 4, would be $x^3 = ax^2 + b$, which being constructed according to the rules, exhibits the common geometrical solution of that problem by the circle and parabola.

If an equation be assumed, as $ax = y$, the other by substitution becomes $y = ax$; the locus of the former is a parabola, and of the latter an hyperbola, one of its asymptotes being the base, and the co-ordinates at their intersection will represent $x$ and $y$; the first of the two means is $x$, and in this case $y$ is the other.
Equations also might be formed so as to give a solution of this problem by other combinations of two of the conic sections, one of them not being the circle.

As geometrical magnitudes may be represented by algebra, so algebraical quantities and numbers may be represented by lines. Hence this construction of equations has sometimes been used as an easy method of approximation to the roots of numerical equations. For this purpose, the necessary straight lines must be laid down by means of a scale of equal parts, and the curve lines, on whose intersection the construction depends, must be actually described; the linear roots being measured on the scale will give the numbers required. These operations may be performed with sufficient accuracy for certain purposes; but as they depend on mechanical principles, the approximation obtained by them cannot be continued at pleasure; and hence it is seldom used, except in finding the first step of an approximation, which is to be carried on by other methods.

Scholium.

If the relation between the ordinate and abscissa be fixed, but not expressible by a finite equation, the curve is called Mechanical (a) or Transcendental. This class is also sometimes defined by equations, by supposing either \( x \) or \( y \) in a finite equation to be a curve line, of which the relation to a straight line cannot be expressed in finite terms.

If the variable quantities \( x \) or \( y \) enter the exponents of any term of an equation, the locus of that equation is called an Exponential Curve.

Many properties of these two classes of curves may be discovered from their equations.

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(a) The term Mechanical, in this place, is used merely as the name of a particular class of curves, without implying that they have any more dependence on the principles of Mechanics or Physics than the algebraical curves which have been treated of.
happened about the middle of the seventh century; and the Arabs continued masters of the country, divided into a great number of petty kingdoms or states, under chiefs of their own choosing, till the year 957.

This year, one Abubekeber-ben-Omar, or, as the Spanish authors call him, Abu Texefien, an Arab of the Ziahigian tribe, being provoked at the tyranny of those despots, gathered, by the help of his marabouts or saints, a most powerful army of malcontents, in the southern provinces of Numidia and Libya. His followers were nicknamed Marobites or Morabites; by the Spaniards, Amóravides; probably from their being assembled principally by the saints who were also called Morabites. The Khalif of Káyém's forces were at this time taken up with quelling other revolts in Syria, Mefopotamia, &c. and the Arabs in Spain engaged in the most bloody wars; so that Texefien having nothing to fear from them, had all the succours he could with against the Arabian chekys or petty tyrants, whom he defeated in many battles, and at last drove them not only out of Numidia and Libya, but out of all the western parts, reducing the whole province of Tingi under his dominion.

Texefien was succeeded by his son Yufif, or Joseph, a brave and warlike prince. In the beginning of his reign, he laid the foundation of the city of Morocco, which he designed to make the capital of his empire. While that city was building, he sent some of his marabouts ambassadors to Tremecen (now a province of Algiers), at that time inhabited by a powerful and inoffent sect of Mahometans called Zeneti. The design of this embassy was to bring them back to what he called the true faith; but the Zeneti, defpising his offers, assembled at Amaf, or Amfa, their capital, murdered the ambassadors, and invaded Joseph's dominions with an army of 50,000 men.

The king hearing of their infamous proceedings, speedily mustered his army, and led it by long marches into their country, destroying all with fire and sword; while the Zeneti, instead of opposing his progress, retired as fast as possible towards Fez, in hopes of receiving assistance from thence. In this they were miserably deceived: the Fezzans marched out against them in a hostile manner, and taking up with his unhappy Zeneti, encumbered with their families and baggage, and ready to expire with hunger and weariness, they cut them all to pieces, except a small number who were mostly drowned in attempting to swim across a river, and some others who in their flight perished by falling from the high adjacent rocks. In the mean time Joseph reduced their country to a mere desolation, which was, however, soon peopled by a numerous colony of Fezzans, who settled there under the protection of the reigning kings. In this war it is computed that near a million of the Zenni, men, women, and children, lost their lives.

The reliefs and ambitions temper of Joseph did not let him remain long at peace. He quickly declared war against the Fezzans, reduced them to become his tributaries, and extended his conquests all along the Mediterranean. He next attacked some Arabian chekys who had not yet submitted to his jurisdiction; and pursued them with such fury, that neither the Libyan deserts, nor ridges of the most craggy rocks, could shelter them from his arms. He attacked them in such of their retreats, castles, and fortresses, as were still then deemed impregnable: and at last subdued them, to the great grief of the other African nations, who were greatly annoyed by the ravages committed by his numerous forces.

Thus was founded the empire of the Morabites; which, however, was of no long duration; being in the 12th century driven out by Mohaveds, a marabout. This race of priests was expelled by Abdul-Darr governor of Fez; and he, in the 13th century, stripped of his new conquests by the Sharifs of Hafien, and the descendants of those Arabian princes whom Abu-Texeien had formerly expelled.

The better to secure their new dominions, the Sharifs divided them into several little kingdoms or provinces; and among the rest the present kingdom of Algiers was divided into four, namely, Tremecen, Tenez, Algiers proper, and Bajeyah. The four first monarchs laid so good a foundation for a lasting balance of power between their little kingdoms, that they continued for some centuries in mutual peace and amity; but at length the king of Tremecen having ventured to violate some of their articles, Abul-Fariz, king of Tenez, declared war against him, and obliged him to become his tributary. This king dying soon after, and having divided his kingdom among his three sons, new discord arose; which Spain taking advantage of, a powerful fleet and army was sent against Barybar, under the Count of Navarre, in 1505. This commander soon made himself master of the important cities of Oran, Bajeyah, and some others; which is alarmed from the Algériens, that they put themselves under the protection of Selim Eltemi, a noble and warlike Arabian prince. He came to their assistance with a great number of his bravest subjects, bringing with him his wife Zaphira, and a son then about 12 years old. This however was not sufficient to prevent the Spaniards from landing a number of forces near Algiers that same year, and obliging that metropolis to become tributary to Spain. Nor could Prince Selim hinder them from building a strong fort on a small island opposite to the city, which terrifed their corsairs from sailing either in or out of the harbour.

To this galling yoke the Algeriens were obliged to submit till the year 1516; when, hearing of the death of Ferdinand king of Spain, they sent an embassay to Aruch Barbarofa, who was at this time no less dreaded for his valour than his surpaizing success, and was then sent on a cruize with a squadron of galleys and barks. The purport of the embassay was, that he should come and free them from the Spanish yoke; for which they agreed to pay him a gratuity answerable to so great a service. Upon this Barbarofa immediately dispatched 18 galleys and 30 barks to the assistance of the Algerines; while he himself advanced towards the city with 800 Turks, 3000 Jigelites, and 2000 Moorish volunteers. Instead of taking the nearest road to Algiers, he directed his course towards Sharif-lo, where Hafien, another famed corsair, had settled himself. He surprised him, and obliged to surrender: not without a previous promise of friendship: but no sooner had Barbarofa got him in his power, than the cut off his head; and obliged all Hafien's Turks to follow him in his new expedition.

On Barbarofa's approach to Algiers, he was met by Prince
prince Eutemi, attended by all the people of that metropolis, great and small; who looked for deliverance from this abandoned villager, whom they accounted in- 
vincible. He was conducted into the city amidst the 
acclamations of the people, and lodged in one of the 
nobles apartments of prince Eutemi’s place, where 
he was treated with the greatest marks of distinction. 
Eulogized beyond measure with this kind reception, Bar- 
baroffa formed a design of becoming king of Algiers; 
and fearing some opposition from the inhabitants, on 
account of the excesses he suffered his soldiers to com-
mitted, murdered prince Eutemi, and caused himself to be 
proclaimed king; his Turks and Moors crying out as 
he rode along the streets, “Long live King Archu 
Barbaroffa, the invincible king of Algiers, the chosen 
of God to deliver the people from the oppression of 
the Christians; and destruction to all that shall oppose, or 
refuse to own him as their lawful sovereign.” These 
last threatening words so intimidated the inhabitants, 
already apprehensive of a general massacre, that he was 
immediately acknowledged king. The unhappy prin-
cess Zaphira, it is said, poisoned herself, to avoid the 
brutality of this new king, whom the unsuccessfuilly in-
deavoured to stab with a dagger.

Barbaroffa was no sooner seated on the throne, than 
he treated his subjects with such cruelty, that they used 
to shut up their houses and hide themselves when he ap-
ppeared in public. In consequence of this, a body was 
soon formed against him; but being discovered, he cau-
ted twenty of the principal conspirators to be behead-
ed, their bodies to be buried in a dunghill, and laid a 
heavy fine on those who survived. This terrified the 
Algerines, that they never afterwards durst attempt 
any thing against either Barbaroffa or his successors.

In the mean time, the son of prince Eutemi having 
flown to Oran, and put himself under the protection of 
the marquis of Gomarez, laid before that nobleman a 
plan for putting the city of Algiers into the hands of 
the king of Spain. Upon this, young Selim Eutemi 
was sent to Spain, to lay his plan before cardinal Xi-
menes; who having approved of it, sent a fleet with 
10,000 land forces, under the command of Don Francis-
to, or, as others called him, Don Diego de Vera, to drive 
out the Turks, and restore the young prince. But the 
fleet was no sooner come within sight of land, than 
it was dispersed by a storm, and the greatest part of 
the ships dashed against the rocks. Most of the Spa-
niards were drowned; and the few who escaped to shore 
were either killed by the Turks or made slaves.

Though Barbaroffa had nothing to boast on this oc-
casion, his pride and insolence were now swelled to such 
a degree, that he imagined himself invincible, and that 
the very elements conspired to make him so. The A-
rabians were so much alarmed at his successes, that they 
implored the assistance of Hamidel Abdes king of Te-
nez, to drive the Turks out of Algiers. That prince 
readily undertook to do what was in his power for this 
purpose, provided they agreed to settle the kingdom 
on himself and his descendants. This proposal being 
accepted, he immediately set out at the head of 10,000 
Moors; and, upon his entering the Algerine domin-
oins, was joined by all the inhabitants. Barbaroffa 
engaged him, only with 1000 Turkish muf-
queteers and 500 Granada Moors; totally defeated his 
numerous army; pursued him to the very gates of his 
capital, which he easily made himself master of; and, 
having given it up to be plundered by his Turks, obli-
ged the inhabitants to acknowledge him as their fuse-
reign. This victory, however, was chiefly owing to 
the advantage which his troops had from their fire-
arms; the enemy having no other weapons than ar-
rows and javelins.

No sooner was Barbaroffa become master of the king-
dom of Tenez, than he received an embassy from 
the inhabitants of Treemecen; inviting him to come to 
their assistance against their then reigning prince, with 
whom they were dissatisfied on account of his having dethro-
ned his nephew, and forced him to fly to Oran, offering 
him even the sovereignty, in case he accepted of 
their proposal. The king of Treemecen, not sifts peading 
the treachery of his subjects, met the tyrant with an 
army of 6000 horse and 3000 foot: but Barbaroffa’s 
artillery gave him such an advantage, that the king 
was at length forced to retire into the capital; which 
he had no sooner entered than his head was cut off, and 
fled to Barbaroffa, with a fresh invitation to come and 
take possession of the kingdom. On his approach, he 
was met by the inhabitants, whom he received with great 
complaisance, and many fair promises; but beginning 
to tyrannize as usual, his new subjects soon convinced 
him that they were not so passive as the inhabitants of 
Algiers. Apprehending, therefore, that his reign 
might prove unjust and precarious, he entered into an 
alliance with the king of Fez; after which, he took 
care to secure the reft of the cities in his new kingdom 
by garrisoning them with his own troops. Some 
of these, however, revolted soon after; upon which he 
sent one of his corsairs, named Efsander, a man no les 
cruel than himself, to reduce them. The Tremeceni-
ans now began to repent in good earnest of their 
habitants having invited such a tyrant to their assistance; 
and held conferences on the most proper means of driving him 
away, and bringing back their lawful prince Abuchen 
Men; but their cabals being discovered, a great num-
ber of the conspirators were massacred in the most cruel 
manner. The prince had the good luck to escape to 
Oran, and was taken under the protection of the mar-
quis of Gomarez, who sent immediate advice of it to 
Charles V. then lately arrived in Spain, with a power-
ful fleet and army. That monarch immediately or-
ed the young king a succour of 10,000 men, under the 
command of the governor of Oran; who, under the 
guidance of Abuchen Men, began his march towards 
Treemecen, and in their way they were joined by prince 
Selim, with a great number of Arabs and Moors. The 
first thing they resolved upon was, to attack the im-
portant fortes of Calau, situated between Treemecen 
and Algiers, and commanded by the corsair Efsander 
at the head of about 300 Turks. They invested it 
closely on all sides, in hopes Barbaroffa would come out 
of Treemecen to its relief, which would give the Trem-
ecenians an opportunity of keeping him out. That 
tyrant, however, kept close in his capital, being em-
arrassed by his fears of a revolt, and the polite delays 
of the king of Fez, who had not sent the auxiliaries 
he promised. The garrison of Calau, in the mean 
time, made a brave defence; and, in a gory they made 
at night, cut off near 300 Spaniards. This encouraged 
them to venture a second time; but they were now re-
pelled with great loss, and Efsander himself wounded; 
soon
Barbaroffa being soon informed that Abuchen Men, with his Arabs, accompanied by the Spaniards, were in full march to lay siege to Tremecen, thought proper to come out, at the head of 1500 Turks and 5000 Moorish horse, in order to break his way through the enemy: but he had not proceeded far from the city, before his council advised him to return and fortify himself in it. This advice was now too late; the inhabitants being resolved to keep him out, and open their gates to their own lawful prince as soon as he appeared. In this distress Barbaroffa saw no way left but to retire to the citadel, and there defend himself till he could find an opportunity of fealing out with his men and all his treasure. Here he defended himself vigorously; but his provisions failing him, he took advantage of a subterfum which had served him so well to be digged up for that purpose, and, taking his immense treasure with him, stole away as secretly as he could. His flight, however, was soon discovered: and he was so closely pursued, that to assure, as he hoped, the enemy, he caused a great deal of provilions to be taken with him, and to his comrades, &c. to be scattered all the way, thinking they would not fail to stop his pursuit together it up. This stratagem, however, failed, through the vigilance of the Spanish commander, who being himself at the head of the pursuers, obliged them to march on; till he was come up close to them on the banks of the Hvaeeda, about eight leagues from Tremecen. Barbaroffa had just crossed the river with his vanguard, when the Spaniards came up with his rear on the other side, and cut them all off; and then crossing the water, overthrew him in a small distance from it. Here a bloody engagement ensued, in which the Turks fought like as many lions; but, being at length overpowered by numbers, they were all cut to pieces, and Barbaroffa among the rest, in the 40th year of his age, and four years after he had raised himself to the royal title of feige of the adjacent country, two years after he had taken the preeminence of Algiers, and scarce a twelvemonth after the reduction of Tremecen. His head was carried to Tremecen, on the point of a spear; and Abuchen Men proclaimed king, to the joy of all the inhabitants. A few days after the flight, the king of Fez made his appearance at the head of 20,000 horse, near the field of battle; but hearing of Barbaroffa’s defeat and death, marched off with all possible speed, to avoid being attacked by the enemy.

The news of Barbaroffa’s death spread the utmost consternation among the Turks at Algiers; however, they caused his brother Hayradin to be immediately proclaimed king. The Spanish commander now sent back the emperor’s forces, without making any attempt upon Algiers; by which he lost the opportunity of driving the Turks out of that country; while Hayradin, justly dreading the confquences of the tyranny of his officers, fought the protection of the Grand Signior. This was readily granted, and himself appointed ballaw or viceroy of Algiers; by which means he received such considerable reinforcements, that the unhappy Algerines durst not make the least complaint; and such numbers of Turks reforted to him, that he was not only capable of keeping the Moors and Arabs in subjection at home, but of annoying the Christians at sea. His first step was to take the Spanifh fort abovementioned, which was a great nuisance to his metropolis. The Spaniards held out to the last extremity; but being all slain or wounded, Hayradin easily became master of the place.

Hayradin next set about building a strong mole for the safety of his ships. In this he employed 30,000 Christian slaves, whom he obliged to work without intermission for three years; in which time the work was completed. He then caused the fort he had taken from the Spaniards to be repaired, and placed a strong garrison in it, to prevent any foreign vessels from entering the harbour without giving an account of themselves. By these two important works, Hayradin soon became dreaded not only by the Arabs and Moors, but also by the maritime Christian powers, especially the Spaniards. The viceroy failed not to acquaint the Grand Signior with his success, and obtained from him a fresh supply of money, by which he was enabled to build a stronger fort, and to erect batteries on all places that might favour the landing of an enemy. All these have since received greater improvements from time to time, as often as there was occasion for them.

In the mean time the Sultan, either out of a sense of succeeded the great services Hayradin had done, or perhaps but by Alfant of jealousy left him should make himself independent, Aga raised Hayradin to the dignity of baron of the empire, and appointed Aga Aga, a Sardinian renegade, an intrepid warrior, and an experienced officer, to succeed him as ballaw of Algiers. Hayradin had no sooner taken possession of his new government, than he began to pursue his ravages on the Spanish coast with greater fury than ever; extending them to the ecclesiastical state, and other parts of Italy. But Pope Paul III. being alarmed at this, exerted the emperor Charles V. to send a powerful fleet to stoppeth those frequent and cruel piracies; and, that nothing might be wanting to render the interceptive successful, a bull was published by his holiness, wherein a pious abstinence of fish, and the crown of martyrdom, was promised to all those who either fell in battle or were made slaves; the emperor on his part needed no spur; and therefore set sail at the head of a powerful fleet consisting of 120 ships and 20 galleys, having on board 30,000 chosen troops, an immense quantity of money, arms, ammunition, &c. In this expedition many young nobility and gentry attended as volunteers, and among these many knights of Malta, so remarkable for their valour against the enemies of Christianity. Even ladies of birth and character attended Charles in his expedition, and the wives and daughters of the officers and soldiers followed them with a design to settle in Barbary after the conquest was finished. All these meeting with a favourable wind, soon appeared before Algiers; every ship displaying the Spanish colours on the stern, and another at the head, with a crucifix to serve them for a pilot.

By this prodigious armament, the Algerines were Algiers in thrown into the utmost consternation. The city was great con

Barbaroffa defeated and killed by the Spaniards.

Succeeded by Hayradin.
Soon after this, the prophet Yusuf, who had foretold the destruction of the Spaniards, was not only declared the deliverer of his country, but had a considerable gratuity decreed him, with the liberty of exercising his prophetic function unmolested. It was not long, however, before the marabouts, and some interpreters of the law, made a strong opposition against him; re-monstrating to the baibaw, how ridiculous and scandalous it was to their nation, to acribe the deliverance of it to a poor fortune-teller, which had been obtained by the fervent prayers of an eminent faint of their own profession. But though the bahaw and his douwan deemed, out of policy, to give into his last notion, yet the impression which Yusuf's predictions and their late accomplishments had made upon the minds of the common people, proved too strong to be eradicated; and the spirit of divination and conjuring has since got into such credit among them, that not only their great statesmen, but their priests, marabouts, and fannoos, have applied themselves to that study, and dignified it with the name Mahomet's Revelations.

The unhappy Spaniards had scarce reached their ships, when they were attacked by a fresh storm, in which several more of them perished; one ship in particular, containing 700 soldiers, besides sailors, sunk in the emperor's sight, without a possibility of saving a single man. At length, with much labour, they reached the port of Bujejah, at that time possessed by the Spaniards, whither Haifan king of Tunis soon after repaired, with a supply of provisions for the emperor, who received him graciously, with fresh assurances of his favour and protection. Here he diffimled the few remains of the Maltese knights and their forces, who embarked in three shattered galleys, and with much difficulty and danger reached their own country. Charles himself said no longer than till the 16th of November, when he fell sick of Carthagena, and reached it on the 25th of the same month. In this unfortunate expedition upwards of 280 ships and galleys were lost, above 300 colonels and other land and sea officers, 8000 soldiers and marines, besides those destroyed by the enemy on the reembarkation, or drowned in the last storm. The number of prisoners was so great, that the Algerines sold some of them, by way of contempt, for an onion per head.

Haifan, elated with this victory, in which he had so little share, undertook an expedition against the king of Tremecen, who, being now deprived of the assistance of the Spaniards, was forced to procure a peace by paying a vast sum of money, and becoming tributary to him. The baibaw returned to Algiers, laden with riches; and soon after died of a fever, in the 66th year of his age.

From this time the Spaniards were never able to annoy the Algerines in any considerable degree. It is said, when taken from 1555, they left the city of Bujejah, which was then captured by Saliba Rais, Haifan's successor; who next year set out with a new expedition, which he kept a secret, but was suspected to be intended against Oran: but he was scarcely got four leagues from Algiers, when the plague, which at that time raged violently in the city, broke out in his train, and carried him off in 24 hours.

Immediately after his death the Algerine soldiery chose a Corsican renegade, Haifan Corfo, in his room, baibaw by till they should receive further orders from the Porte, the Janissaries.
He did not accept of the bashawhip without a good deal of difficulty; but immediately prosecuted the intended expedition against Oran, dispatching a messenger to acquaint the Porte with what had happened. They had hardly begun their hostilities against the place, when orders came from the Porte, expressly forbidding Haifan Corfo to begin the siege, or, if he had begun it, enjoining him to raise it immediately. This news was received with great grief by the whole fleet and army, as they thought themselves sure of success, the garrison being at that time very weak. Nevertheless, as they dared not disobey, the siege was immediately raised.

Corfo had hardly enjoyed his dignity four months, before news came, that eight galleys were bringing a new bashaw to succeed him; one Tekelli, a principal Turk of the Grand Signior’s court: upon which the Algerines unanimously resolved not to admit him. By the treachery of the Levantine soldiers, however, he was admitted at first, and the unfortunate Corfo thrown over a wall in which a number of iron hooks were fixed; one of which catching the ribs of his right side, he hung three days in the most exquisite torture before he expired.

Tekelli was no sooner entered upon his new government, than he behaved with such cruelty and rapacity, that he was assassinated even under the dome where they were so shamefully repulsed by an handful of Spaniards by Tekelli, who put him to a cruel death.

Yusef was succeeded by Haifan the son of Hayraddin, who had been formerly recalled from his bashawhip, when he was succeeded by Selha-Reis; and now had the good fortune to get himself reinstituted in his employment. Immediately on his arrival, he engaged in a war with the Arabs, by whom he was defeated with great loss. The next year, the Spaniards undertook an expedition against Moftagan, under the command of the count d’Alcandela; but were utterly defeated, the commander himself killed, and 12,000 taken prisoners. This disaster was owing to the incon siderable rashness, or rather madness, of the commander; which was so great, that, after finding it impossible to rally his scattered forces, he rushed, sword in hand, into the thickest of the enemy’s ranks, at the head of a small number of men, crying out, “St Jago! St Jago! the victory is ours, the enemy is defeated,” soon after which he was thrown from his horse, and trampled to death.

Haifan having had the misfortune to disoblige his subjects by allowing the mountainers of Cuco to buy ammunition at Algiers, was sent in iron to Constan tinople, while the aga of the Janissaries, and general of the land forces, supplicated his place.—Haifan easily found means to clear himself; but a new bashaw was appointed, called Achmet; who was no sooner arrived, than he sent the two deputy-bashaws to Constan tinople, where their heads were struck off.—Achmet was a man of such infatiable avarice, that, upon his arrival at Algiers, all ranks of people came in crowds to make him presents; which he more greedily accepted, as he had bought his dignity by the money he had amassed while head gardener to the Sultan. He enjoyed it, however, only four months; and after his death, the state was governed other four months by his lieutenant; when Haifan was a third time sent viceroy to Algiers, where he was received with the greatest demonstrations of joy.

The shift enterprize in which Haifan engaged, was the siege of Marfaquiwer, situated near the city Oran, Siege of Marfaquiwer. The army employed in this siege consisted of 26,000 foot and 10,000 horse, besides which he had a fleet consisting of 50 galleys and gallions, together with three French vessels laden with biscuit, oil, and other provisions. The city was defended by Don Martin de Cordova, brother of the Count d’Alcandela, who had been taken prisoner in the battle where that nobleman was killed, but had obtained his liberty from the Algerines with immense sums, and now made a most gallant defence against the Turks. The city was attacked with the utmost fury by sea and land, so that several breaches were made in the walls. The Turkish standards were several times planted on the walls, and as often dislodged; but the place must have in the end submitted, had not Haifan been obliged to raise the siege in haste, on the news that the famed Genoese admiral Doria was approaching with considerable forces from Italy. The fleet accordingly arrived soon after; but missing the Algerine gallies, bore away for Penon de Velez, where they were shamefully repulsed by an handful of Turks who garrisoned that place; which, however, was taken the following year.

In 1567, Haifan was again recalled to Constan tinople, where he died three years after. He was suc ceeded by Mahomet, who gained the love of the Algerines by several public spirited actions. He incorporated the Janissaries and Levantine Turks together, and by that means put an end to their dissensions, which laid the foundation of the Algerine independency on the Porte. He likewise added some considerable fortifications to the city and castle, which he designed to render impregnable. But while he was thus studying the interests of Algiers, one John Gascon, a bold Span ish adventurer, formed a design of surprising the whole piratic navy in the bay, and setting them on fire in the night-time, when they lay defenceless, and in their first sleep. For this he had not only the permission of king Philip II. but was furnished by him with proper vessels, mariners, and fire-works, for the execution of his plot. With these he fell on Algiers in the most proper season, viz. the beginning of October, when most, if not all the ships lay at anchor there; and easily sailed near enough, unsuspected, to view their manner of riding, in order to catch them napping, at a time when the greater part of their crew were dispersed in their quarters. He came accordingly, unperceived by any, to the very mole-gate, and dispersed his men with their fire-works; but to their great surprize, they found them so ill mixed, that they could not with all their art make them take fire. In the mean time, Gascon took it into his head, by way of bravado, to go to do at the mole-gate, and give three loud knocks at it with city gate. the pommel of his dagger, and to leave it fixed in the gate by its point, that the Algerines might have cause to remember him. This he had the good fortune to do without meeting with any disturbance or opposition: but it was not so with his men; for no sooner did they find their endeavours unsuccessful, than they made such a battle as quickly alarmed the gendar soldiery on the adja
Algiers, from which the uproar quickly spread itself thro' the whole garrison. Gafcon, now finding himself in the utmost danger, falled away with all possible haste: but he was pursued, overtaken, and brought back a prisoner to Mahomet; who no sooner got him into his power, than he immediately caused a gibbet of considerible height to be erected on the spot where Gafcon had landed, ordering him to be hoisted up, and hung by the feet to a hook, that he might die in exquisite torture; and to shew his resentment and contempt of the king his master, he ordered his commiss on to be tied to his toes. He had not, however, hung long in that state, when the captain who took him, accompanied by a number of other corsairs, interceded so strongly in his behalf, that he was taken down, and put under the care of some Christian surgeons; but two days after, some Moors reporting that it was the common talk and belief in Spain, that the Algerines durst not hurt a hair of Gafcon's head, &c. the unfortunate Spaniard was hoisted up by a pulley to the top of the execution-wall, and let down again upon the hook, which in his fall caught him by the belly, and gave him such a wound, that he expire without a groan. — Thus ended the expedition of John Gafcon, which has procured him a place among the Spanish martyrs; while, on the other hand, the Algerines look upon his disappointment to have been miraculous, and owing to the efficacious protection of the powerful saint Sidi Outededda, whose prayers had before raised such a terrible flood against the Spanish fleet.

Mahomet, being soon after recalled, was succeeded by the famous renegade Ochali, who reduced the kingdom of Tunis; which, however, remained subject to the viceroy of Algiers only till the year 1566, when a bath of Tunis was appointed by the Porte.

The kingdom of Algiers continued to be governed, till the beginning of the seventeenth century, by viceroys or bahaws appointed by the Porte; concerning whom we find nothing very remarkable, further than that their avarice and tyranny was intolerable both to the Algerines and the Turks themselves. At last the Turkish Janizaries and militia becoming powerful enough to support the tyrannic sway of these bahaws, and the people being almost exhausted by the heavy taxes laid upon them, the former resolved to depose these petty tyrants, and set up some officers of their own at the head of the realm. The better to succeed in this attempt, the militia sent a deputation of some of their chief members to the Porte, to complain of the avarice and oppression of these bahaws, who fulk both the revenue of the state, and the money remitted to it from Constantinople, into their own coffers, which should have been employed in keeping up and paying the soldiery; by which means they were in continual danger of being overpowered by the Arubians and Moors, who, if ever so little affiled by any Christian power, would hardly fail of driving all the Turks out of the kingdom. They represented to the Grand Vizir how much more honourable, as well as easier and cheaper, it would be for the grand Signior to permit them to choose their own day, or governor, from among themselves, whose interest it would then be to see that the revenue of the kingdom was rightly applied in keeping up its forces complete, and in supplying all other exigencies of the state, without any further charge or trouble to the Porte than that of allowing them its protection. On their part, they engaged always to acknowledge the Grand Signior as their sovereign, and to pay them their usual allegiance and tribute, to respect their bahaws, and even to lodge and maintain them and their retinue, in a manner suitable to their dignity, at their own charge. The bahaws, however, were, for the future, to be excluded from affairs at any but general downans, unless invited to it; and from having the liberty of voting in them, unless when their advice was asked, or the interest of the Porte was likely to suffer by their silence. All other concerns, which related to the government of Algieries, were to be wholly left under the direction of the day and his downan.

These proposals having been accepted by the Porte, the deputies returned highly satisfied; and having notified their new privileges, the great downans immediately proceeded to the election of a day from among themselves. They decided on a new set of laws, and made several regulations for the better support and maintenance of this new form of government, to the observation of which they obliged all their subjects to swear; and the militia, navy, commerce, &c. were all settled pretty nearly on the footing upon which they now are, and which shall be afterwards described; the subsequent alterations that frequently happened between the bahaws and deys, the one endeavouring to recover their former power, and the other to curtail it, caused such frequent complaints and differences at the Ottoman court, as made them frequently repent their compliance.

In the year 1601, the Spaniards, under the command of Doris the Genoese admiral, made another attempt upon Algiers, in which they were more fortunate than usual, their fleet being only driven back by contrary winds, so that they came off without loss. In 1609, the Moors being expelled from Spain, flocked in great numbers to Algiers; and as many of them were very able sailors, they undoubtedly contributed to make the Algerine fleet so formidable as it became soon after; tho' it is probable the frequent attempts made on their city would also induce them to increase their fleet. In 1616, their fleet consisted of 40 sail of ships between 200 and 400 tons, their admiral sectoins. It was divided into two squadrons, one of 18 sail, before the port of Malaga; and the other at the Cape of Santa Maria, between Lisbon and Seville; both of which fell foul on all Christian ships, both English and French, with whom they pretended to be in friendship, as well as Spaniards and Portuguese, with whom they were at war.

The Algerines were now become very formidable to the European powers. The Spaniards, who were most formidable in danger, and least able to cope with them, solicited to the European powers for the assistance of England, the pope, and other states. The French, however, were the first who dared to shew their resentment of the perfidious behaviour of these miscreants; in 1617, M. Beaulieu was sent against them with a fleet of 50 men of war, who defeated their fleet, took two of their vessels, while their admiral sunk his own ship and crew, rather than fall into his enemies hands.

In 1620, a squadron of English men of war was sent against Algiers, under the conduct of Sir Robert Manley;
of this expedition we have no other account, than that it returned without doing any thing;
and the Algerines, becoming more and more insolent, openly defied all the European powers, the Dutch only excepted; to whom, in 1623, they sent a propofal, directed to the prince of Orange, that in case they would fit out 20 fail of ships the following year, upon any good service against the Spaniards, they would join them with 60 fail of their own.

The next year, the Couloies, or Cellogies (the children of such Turks as had been permitted to marry at Algiers), who were enrolled in the militia, having feized on the citadel, had no high made themselves masters of the city; but were attacked by the Turks and renegades, who defeated them with terrible slaughter. Many scores of them were executed; and their heads thrown in heaps upon the city-walls, without the eastern gate. Part of the citadel was blown up; and the remaining Culiolles were dispersed from the militia, to which they were no again admitted till long after.

In 1623, the Algerines and other states of Barbary threw off their dependence on the Porte, and set up for themselves. What gave occasion to this was the 25 years truce which Sultan Amurath IV. was obliged to make with the emperor Ferdinand II. to prevent his being overmatched by carrying on the war at the same time. As this put a stop to the piratical trade of the Algerines, they proceeded as above-mentioned, and resolved, that whofe defiered to be at peace with them, must, definitively and separately, apply to their government.

No fooner was this resolution taken, than the Algerines began to make prizes of several merchant ships belonging to powers at peace with the Porte. Nay, having feized a Dutch ship and pasture at Scandereroon, they ventured on shore; and finding the town abandoned by the Turkish aga and inhabitants, they plundered all the magazines and warehouses, and set them on fire. About this time Lewis XIII., undertook to build a fort on their coasts, instead of one formerly built by the Marfilians, and which they had demolished. This, after some difficulty, he accomplished; and it was called the Bafion of France; but the situation being afterwards found inconvenient, the French purchased the port of La Calle, and obtained liberty to trade with the Arabs and Moors.

The Alban court, in the mean time, was so much embarrassed with the Perfian war, that there was no leisure to check the Algerine piracies. This gave an opportunity to the vizir and other courtiers to compound matters with the Algerines, and to get a share of their prizes, which were very considerable. However, for form's sake, a severe reprimand, accompanied with threats, was sent them; to which they replied, that "these depredations deferred to be indulged to them, seeing they were the only bulwark against the Christifan powers, especially against the Spaniards, the sworn enemies of the Moslem name." Adding, that "if they should pay a punctual regard to all that would purchase peace, or liberty to trade with the Ottoman empire, they would have nothing to do but set fire to all their shipping, and turn camel-drivers for a livelihood."

In the year 1625, four younger brothers of a good family in France, entered into an undertaking to defend, that perhaps the annals of knight-errantry can

fearful furnish its equal.—This was no less than to red

Algerines, 1

The Algerines profecuted their piracies with incom

punity, to the terror and disgrace of the Europeans, till the year 1652; when a French fleet being accident

ally driven to Algiers, the admiral took it into his head to demand a release of all the captives of his nation, without exception. This being refused, the Frenchman without ceremony carried off the Turkish vice

roy, and his cadi or judge, who were just arrived from the Porte, with all their equipage and retainue. The Algerines, by way of reprisal, surprifed the Bafion of France already men- tioned, and carried off the inhabitants to the number of 600, with all their effects; which provoked the admiral, that he sent them word that he would pay them another visit the next year with his whole fleet.

The Algerines, undismayed by the threats of the French admiral, fitted out a fleet of 16 galleys and gal

fiots, excellently manned and equipped, under the com

mand of Admiral Hall Pinchinin.—The chief design of this armament was against the treasure of Loreto; which, however, they were prevented by contrary winds from obtaining. Upon this they made a descent on Puglia in the kingdom of Naples; where they rava

ged the whole territory of Nocera, carrying off a large number of captives, and amongst them some nuns. From thence steering towards Dalmatia, they foured the Adriatic; and loading themselves with immense plunder, left those coasts in the utmost consternation and re

sentiment.

At last the Venetians, alarmed at such terrible de

predations, equipped a fleet of 28 fail, under the com

mand of admiral Capello, which express orders to burn, sink, or take, all the Barbary corsairs he met with, ei

ter on the open seas, or even in the Grand Signor's harbours, pursuant to a late treaty of peace with the Porte. On the other hand, the captain bailiff, who had been sent out with the Turkish fleet to chase the Florentine and Maltese cruisers out of the Adriatic lagoon, understanding that the Algerine squadron was so near, sent express orders to the admiral to come to his assistance. Pinchinin readily agreed; but having first resolved on a descent upon the island of Livat, or Lif

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Algiers, belonging to the Venetians, was overtaken by Capello, from whom he retired to Valona, a sea-port belonging to the Grand Signior, whither the Venetian admiral pursued him; but the Turkish governor returning to eject the pirates according to the articles of the peace between the Ottoman court and Venice, Capello was obliged to content himself with watching them for some time. Pinchinin was soon weary of restraint, and ventured out; when an engagement immediately ensued, in which the Algerines were defeated, and five of their vessels disabled; with the loss of 1500 men, Turks, and Christian slaves; besides 1600 galley-slaves, who regained their liberty. Pinchinin, after this defeat, returned to Valona, where he was again watched by Capello; but the latter had not lain long at his old anchorage before he received a letter from the senate, desiring him to make no further attempt on the pirates at that time, for fear of a rupture with the Porte. This was followed by a letter from the governor of Valona, desiring him to take care lest he incurred the Sultan's displeasure by such infults. The brave Venetian was forced to comply; but, resolving to take such a leave of the Algerines as he thought they deserved, observed how they had reared their tents, and drawn up their lines along the shore. He then kept firing among their tents, while some well-manned galleys and brigantines were ordered among their shipping, who attacked them with such bravery, that, without any great loss, they towed out their 16 galleys, with all their cannon, horses, &c. In this left engagement, a ball from one of the Venetian galleys happening to strike a Turkish mosque, the whole action was considered as an insult upon the Grand Signior. To conceal this, Capello was ordered to sink all the Algerine ships he had taken, except the admiral; which was to be conducted to Venice, and laid up as a trophy. Capello came off with a severe reprimand; but the Venetians were obliged to buy, with 500,000 ducats, a peace from the Porte. The Grand Signior offered to repair the loss of the Algerines by building ten galleys for them, upon condition that they should continue in his service till the end of the ensuing summer; but Pinchinin, who knew how little the Algerines chose to lie under obligation to him, civilly declined the offer.

In the meantime, the news of this defeat and loss filled Algiers with the utmost grief and confusion. The whole city was on the point of a general insurrection, when the bawhaw and dowounif issued a proclamation, forbidding, not only complaints and outcries, under the severest penalties; but all persons whatever to take their thumbs from within their girdles, while they were deliberating on this important point. In the mean time, they applied to the Porte for an order, that the Venetians settled in the Levant should make up their loss. But with this the Grand Signior refused to comply, and left them to repair their losses, as well as build new ships, in the best manner they could. It was not long, however, before they had the satisfaction to see one of their corsairs land, with a fresh supply of 600 slaves, whom he had brought from the coast of Iceland, whither he had been directed by a miscreant native taken on board a Danish ship.

Our pirates did not long continue in their weak and defenceless state; being able, at the end of two years, to appear at sea with a fleet of 65 galleys. The admiral Pinchinin equipped four galleys at his own expense; with which, in conjunction with the Chiajah, or secretary of the bath of Tripoli, he made a second excursion. This small squadron, consisting of five galleys and two brigantines, fell in with an English ship of 40 guns; which, however, Pinchinin's captains refused to engage; but being afterwards reproached by him for their cowardice, they swore to attack the next Christian ship which came in their way. This happened to be a Dutch merchantman, of 25 guns and 40 men, deeply laden, and unable to use her sails by reason of a calm. Pinchinin immediately summoned her to surrender; but receiving an ironical answer, drew up his squadron in form of an half-moon, that they might pour their shot all at once into their adversary. This, however, the Dutchman avoided, by means of a breeze of wind which fortunately sprung up and enabled him to turn his ship; upon which the galleys ran foul of each other. Upon this, Pinchinin ran his own galley along side of the merchantman, the upper deck of which 70 Algerines immediately took possession of, some of them cutting the rigging, and others plying the hatches with hand-grenades: but the Dutchmen, having secured themselves in their close quarters, began to fire at the Algerines on board, from two pieces of cannon loaded with small shot; by which they were all foon killed, or forced to submit. Pinchinin, in the mean time, made several unsuccessful attempts to receive his men, as well as to surround the Dutchman with his other galleys; but that ship lay so deep in the water, that every shot did terrible execution amongst the pirates; so that they were obliged to remove farther off. At last the Dutch captain, having ordered his guns to be loaded with cartouches, gave them such a parting volley as killed 200 of them, and sent the rest back to Algiers in a most dismal plight.

But though Pinchinin thus returned in disgrace, the rest of the fleet quickly came back with vast numbers of slaves, and an immense quantity of rich spoils; incomparable to that of which the English, French, and Dutch, were obliged to crie to the mighty Algerines, who sometimes vouchsafed to be at peace with them, but swore eternal war against Spain, Portugal, and Italy, whom they looked upon as the greatest enemies to the Mahometan name. At last Lewis XIV. provoked by the grievances committed by the Algerines on the coasts of Provence, and Languedoc, ordered, in 1681, a considerable fleet to be fitted out against them, under the Marquis de Queste, vice-admiral of France. His first expedition was against a number of Tripolitan corsairs; who had the good fortune to outrow him, and shelter themselves in the island of Scio belonging to the Turks. This did not, however, prevent him from pursuing them thither, and making such terrible fire upon them as quickly destroyed 14 of their vessels, besides battering the walls of the castle.

This severity seemed only to be designed as a check to the piracies of the Algerines; but, finding they still continued their outrages on the French coast, he sailed to Algiers in August 1682, cannonading and bombarding it to furiously, that the whole town was in flames in a very little time. The great mosque was neither burnt down, and most of the houses laid in ruins, infomuch that the inhabitants were on the point of abandoning the place; when on a sudden the wind turned about, and
 Algiers

45 Algiers commit dreadful ravages in France.

46 The city again bombarded.

and obliged Du Quefne to return to Toulon. The Algerines immediately made reprisals, by sending a number of galleys and galleons to the coasts of Provence, where they committed the most dreadful ravages, and brought away a vast number of captives: upon which a new armament was ordered to be got ready at Toulon and Marseille against the next year; and the Algerines, having received timely notice, put themselves into as good a state of defence as the time would allow.

In May 1685, Du Quefne with his squadron cast anchor before Algiers; where, being joined by the Marquis D’Affranville, at the head of five galleys, the French were brought away. The Algerines, having received timely notice, put themselves into as good a state of defence as the time would allow. The French, finding the Algerines not in a convenient posture to receive battle, gave them no time to consider of the matter, but immediately delivered up, with a promise of sending him a proper commiffary-general and one of his engineers into the town; but with express orders to infift upon the delivery of all the French captives without exception, together with the effects they had taken from the French; and that Mezomorto their then admiral, and Hali Rais one of their captains, should be given as hostages.

This last demand having embarrassed the dey, he assembled his council, and acquainted them with it; upon which Mezomorto fell into a violent passion, and declared that the Algerines were now at the helm that had occasioned the ruin of Algiers; but that, for his part, he would never consent to deliver up any thing that had been taken from the French. He immediately acquainted the foldingy with what had passed; which so exasperated them, that they murdered the dey that very night, and on the morrow chose Mezomorto in his place. This was no sooner done, than he cancelled all the articles of peace which had been made, and hostilities were renewed with greater fury than ever.

The French admiral now kept pouring in such volleys of bombs, that, in less than three days, the great part of the city was reduced to ashes, and the fire burnt with such vehemence, that the seas was enlightened with it for more than two leagues round. Mezomorto, unmoved at all these disasters, and the vast number of the slain, whose blood ran in rivulets along the streets; or rather, grown furious and desperate, fought only how to wreak his revenge on the enemy; and, not content with caufing all the French in the city to be cruelly murdered, ordered their conftal be tied hand and foo, and fastened alive to the mouth of a mortar, from whence he was shot away against their navies—

By this piece of inhumanity Du Quefne was so exag-
Stadholders, have become more powerful, the douwan is principally composed of 30 chiah-bahaws, or colonels, with now and then the mufiif and cadi upon some emergencies; and on the election of a dey, the whole foldiers are allowed to come and give their votes. All the regulations of state ought to be determined by that asembly, before they pass into a law, or the dey hath power to put them in execution: but, for many years back, the douwan is of so little account, that it is only converted out of formality, and to give assent to what the dey and his chief favorites have concerted beforehand. The method of gathering the votes in this august assembly is perfectly agreeable to the character of those who compose it. The aga, or general of the janies, or the president protempore, first proposes the question; which is immediately repeated with a loud voice by the chiah-bahaws, and from them echoed again by four officers called bahalldales, from the idea the question is repeated from one member of the douwan to another, with strange contortions, and the most hideous growlings, if it is not to their liking. From the loudness of this growling noise, the aga is left to determine what the dey and assembly are pleased to give for the question; and from such a prepositional method, it is not surprising that these assemblies should seldom end without some tumult or disorder. As the whole body of the militia is concerned in the election of a new dey, it is seldom carried on without blows and bloodshed: but when once the choice is made, the person elected is saluted with the words Alle barik, "God bless you, and prosper you!" and the new dey usually causes all the officers of the douwan who had opposed his election to be strangled, filling up their places with those who had been most zealous in promoting it. From this account of the election of the deys, it cannot be expected that their government should be all secure; and as they arrive at the throne by tumult, disorder, and bloodshed, they are generally deprived of it by the same means, scarcely one in ten of them having the good fortune to die a natural death.

In this country it is not to be expected that justice will be administered with any degree of impartiality. The Mahometan foldiers, in particular, are so much favoured, that they are seldom put to death for any crime, except rebellion; in which case they are either strangled with a bow-string, or hanged to an iron hook. In lesser offences, they are flogged, or their pay stopped; and if officers, they are reduced to the station of common soldiers, from whence they may gradually raise themselves to their former dignity. Women guilty of adultery, have a halter tied about their necks, with the other end fastened to a pole, by which they are held under water till they are suffocated. The ballinado is likewise inflicted for small offences; and is given either upon the belly, back, or soles of the feet, according to the pleasure of the cadi; who also appoints the number of strokes. These sometimes amount to 200 or 300, according to the indulgence the offender can obtain either by bribery or friends; and hence he often dies under this punishment, for want of powerful enough advocates. But the most terrible punishments are those inflicted upon the Jews or Christians who speak against Mahomet or his religion; in which case, they must either turn Mahometans, or be impaled alive. If they afterwards apostatize, they are burned or roasted alive, or else thrown down from the top of the city-walls upon iron hooks, where they are caught by different parts of their body, according as they happen to fall, and sometimes expire in the greatest torments; though by accident they may be put out of pain at once, as we have already related of the Spanish adventurer John Gafcon. This terrible punishment, however, begins now to be diffused.

The officer next in power to the dey is the aga of the janies, who is one of the oldest officers in the Janies army, and holds his post only for two months. He is then succeeded by the chiah, or next senior officer. During the two months in which the aga enjoys his dignity, the keys of the metropolis are in his hands; all military orders are issu'd out in his name; and the sentence of the dey upon any offending soldier, whether capital or not, can only be executed in the court of his palace. As soon as he is gone through this short office, he is considered as mazouli, or supernannted, receives his pay regularly, like the other janies officers, and has a right to come at all times, but hath no longer a vote in the government. To the next in the aga in dignity, is the secretary of state, who registers all the public acts; and after him are the 30 chiah or colonels, who next to the aga in the douwan, and in the same gallery with him. Out of this class are generally chosen those who go embassadors to foreign courts, or who dispose of the dey's orders throughout the realm. Next to them are 800 bahack-bahaws, or eldest captains, who are promoted to that of chiah-bahaws, according to their seniority. The oldack-bahaws, or lieutenants, are next; who amount to 400, and are regularly raised to the rank of captains in their turn, and to other employments in the state, according to their abilities. These, by way of distinction, wear a leather fap, hanging down to the middle of their back. One rule is strictly observed in the rotation of these troops from one depot to another; viz. the right of seniority; one single infringement of which would cause an insurrection, and probably cost the dey his life. Other military officers of note are the vezir, or purveyors of the army; the peys, who are the four oldest foldiers, and consequently the nearest to preferment; the fouldiers, who are the next in seniority to them, and are part of the dey's body-guard, always marching before him when he takes the field, and distinguished by their carbiners and gilt fcyrmiers, with a brass gun on their caps; the kayts, or Turkish foldiers, each band of whom have the government of one or more adowars, or itinerant villages, and collect their taxes for the dey; and the fagiards, or Turkish lances, 100 of whom always attend the army, and watch over the water appointed for it. To these we may add the beys, or governors of the three great provinces of the realm. All the above-mentioned officers ought to compose the great douwan or council above-mentioned: but only the 30 chiah-bahaws have a right to sit in the gallery next after the dey; the rest are obliged to stand on the floor of the hall, or council-chamber, with their arms acros, and, as much as possible, without motion; neither are they permitted to enter with their swords on, for fear of a tumult. As for those who
The kingdom of Algiers is at present divided into three provinces or districts, viz. the eastern, western, and southern. The eastern, or Levantine government, which is by far the most considerable of the three, and is also called Beylick, contains the towns of Boano, Constantina, Gigeri, Bujeyah, Stella, Tebef, Zamora, Bifara, and Necanz, in all which the Turks have their garrisons: besides which, it includes the two ancient kingdoms of Cuco and Labez, though independent of the Algerine government, to whose forces their country is inaccessible; so that they still live under their own chekys chosen by each of their adowars or hords. To these we may add a French factory at Callo, under the direction of the company of the French Bafion. — The western government hath the towns of Oran, Tremecan, Moflagan, Tenez, and Secrally with its cable and garrison. — The southern government hath neither town, village, nor even a house, all the inhabitants living in tents, which obliges the key and forces to be always encamped.

The most considerable rivers of Algiers are the Zha, or Zina, which runs across the province of Tremecan, and the desert of Anguid, falling into the Mediterranean near the town of Taberica, where it has the name of Sirut. (2.) The Haregol, supposed the Sign of Ptolemy, comes down from the great Atlas, crosses the desert of Anguid, and falls into the sea, about five leagues from Oran. (3.) The Mina, supposed the Chlematis of Ptolemy, a large river, which runs through the plains of Bithala, and falls into the sea near the town of Arzew. This river hath lately received the name of Cena, who rebuilt the town of Bathala after it had been destroyed. (4.) The Shif, Zilef, or Zilif, descending from the mount Gnauezert, runs through some great deserts, the lake Titteri, the frontiers of Tremecan and Tenez, falling into the sea a little above the city of Moflagan. (5.) The Celic, supposed to be the Carchena of the ancients, falls into the sea about three leagues west of Algiers, after a short course of 18 or 20 leagues. (6.) The Hued-alquivir, supposed to be the Natobola, or Naffa, of the ancients, and called by the Europeans Zinganir, runs down with a swift course, through some high mountains of Cuco, and falls into the sea near Bujeyah. Whilst the city of Bujeyah was in the hands of the Christians, the mouth of this river was locked up with sand, that no vessel could come up into it; but in 1558, very soon after it was taken by the Moors, the great rains filled it to such a degree, that all the sand and mud was carried off; so that galleys, and other vessels, have ever since entered it with ease, where they lie safe from storms, and all winds, but that which blows from the north. (7.) Suf-Gemar, or Suf-Gimmar al Kumm, supposed to be the Ayufaga of Ptolemy, hath its source on mount Auras, on the confines of Atlas; and runs through some barren plains, and the fruitless town of Constantina, where its stream is greatly increased by some other rivers that receive; from thence running northward, along the ridges of some high mountains, it falls into the sea a little east of Gigeri, (8.) The Ladag, or Ludeg, runs down from mount Atlas through part of Contantina, and falls into the sea a little eastward of Bona. (9.) Guadi, or Gaudel Barbar, springs from the head of Orbis, or Urbs, in Tripoli, runs through Bujeyah, and falls into the sea near Tabeira.

Besides these there are many others of less note; of Account of which, however, we do not find that the Algerines avail themselves as they might do, their genius leading them too much to the piratical trade to mind any real advantage that might be derived from their own country. The corsairs, or pirates, form each a small republic, of which the rais or captain is the supreme bailaw; who, with the officers under him, form a kind of douwan, in which every matter relating to the vessel is decided in an arbitrary way. These corsairs are chiefly instrumental in importing whatever commodities are brought into the kingdom either by way of merchandise or prizes. These consist chiefly of gold and silver stuffs, damasks, cloths, fables, tin, iron, plated brass, lead, quicksilver, cordage, flail-clubs, bullets, cochineal, linen, tartar, alum, rice, sugar, soap, cotton raw and spun, copperas, aloes, brazil and logwood, vermilion, &c. Very few commodities, however, are exported from this part of the world: the oil, wax, hides, paffe, and corn produced, being but barely sufficient to supply the country; though, before the loss of Oran, the merchants had been known to ship off from one or other of the ports of Barbary several thousand tons of corn. The consumption of oil, though here in great abundance, is likewise considerable in this kingdom, that it is seldom permitted to be shipped off for Europe. The other exports consist chiefly in oriches feathers, copper, rubies, silk fables, embroidered handkerchiefs, dates, and Christian slaves. Some manufactures in silk, cotton, wool, leather, &c. are carried on in this country, but mostly by the Spaniards settled here, especially about the metropolis. Carpets are also a manufacture of the country, which, though much inferior to those of Turkey, both in beauty and fineness, are preferred by the people to lie upon, on account of their being both cheaper and stouter. There were also, at Algiers, looms for velvet, taffets, and other wrought silks; and a coarse sort of linen is likewise made in most parts of the kingdom. The country furnishes no materials for ship-building. They have neither ropes, tar, flails, anchors, nor even iron. When they can procure enough of new wood to form the main timbers of a ship, they supply the rest from the materials of prizes which they have made; and thus find the secret of producing new and swift sailing vessels from the ruins of the old. Of all the states on the coast of Barbary, the Algerines are the strongest at sea.

The inhabitants along the sea-coasts are a mixture of different nations; but chiefly Moors and Morefois, driven out of Catalonia, Aragon, and other parts of Spain. Here are also great numbers of Turks, who come from the Levant to seek their fortune; as well as multitudes of Jews and Christians taken at sea, who are brought hither to be sold for slaves. The Barbers are some of the most ancient inhabitants of the country; and are supposed to be descended from the ancient Sabians, who came hither from Arabia Felix, under the conduct of one of their princes. Others be-
The name of brick, with a square court on iron, believe barbary, and perhaps chiefs: mobiles or portable huts; others in scattered villages: they have, nevertheless, kept themselves for the most part from intermixing with other nations. The Berbers are reckoned the richest of all, go better clothed, and carry on a much larger traffic of the country at a much higher rate than the Canaanites driven out of the land, and live in tents, or portable huts; others in scattered villages: they have, nevertheless, kept themselves for the most part from intermixing with other nations. The Berbers are reckoned the richest, offer a better exchange without ceremony. The women have baths in public; and the Jews do not. They are rich clothes made of silk, embroidered with flowers of gold, and turbans enriched with jewels. The Turks, who compose the military force, have great privileges, pay no taxes, are never publicly punished, and rarely in private. The lowest sildier dominates over the most distinguished Moors at pleasure. If he finds them better mounted than himself, he changes horses without ceremony. The Turks have the privilege of carrying fire-arms. Many good qualities, however, distinguish them in spite of this excess of despotism. They never game for money, not even for trifles; and they never profane the name of the Deity. They soon forget their private quarrels; and after the first paroxysm of resentment is over, it is infamy for a Turk to keep in remembrance the injuries he has received. In this respect certainly they are less barbarous than other nations that boast of their civilization. See Moors.

Algiers, a city, the capital of the above kingdom, is probably the ancient Iofium; or by the Arabians called Alcazar, or rather Al-jezer, or Al-Jezrar, i.e. the island, because there was an island before the city, to which it had been since joined by a mole. It is built on the declivity of a hill by the sea-side, in the form of an amphitheatre: at sea, it looks like the top-ful of a ship. The tops of the houses are quite flat and white; infomuch, that when it was first discovered, one would take it to be a place where they bleach linen. One house rises above another in such a manner that they do not hinder each other's prospect. The streets are fo narrow, that they will fear to admit two persons to walk 'a-breadth, and the middle part is lower than the sides. When any loaded beasts, such as camels, horses, mules, or asses, pass along, you are forced to stand up close to the wall, to let them pass by. There is but one broad street, which runs through the city from east to west, in which are the shops of the principal merchants, and the market for corn and other commodities. The lower part of the walls of the city are of hewn stone, and the upper part of brick: they are 30 feet high on the land side, and 40 towards the sea; the fosses or ditches are twenty feet broad, and seven deep. There is no sweet water in the city; and tho' there is a tank or cistern in every house, yet they often want water, because it rains but seldom: the chief supply is from a spring on a hill, the water of which is conveyed by pipes above a hundred fountains, at which a bowl is fastened for the use of passengers. The common reservoir is at the end of the mole, where the ships take in their water. Every one takes his turn at these places, except the Turks, who are first, and the Jews last. There are five gates, which are open from morn till noon: and seven forts, or castles, without the wall, the greatest of which is on the mole without the gate, all of which are well supplied with great guns. There are ten large mosques, and fifty small ones; three great college schools, and a great number of petty ones for children. The houies are square, and built of stone and brick, with a square court in the middle, and galleries all round. There are said to be about 10,000 inhabitants in the city, comprising 3000 Jewish families, besides Christians. There are four inns, or public inns, such as are in Turkey, and six cazernes, or barracks, for the married Turkish soldiers, which will hold 600 each. There are no inns for Christians to lodge at; but only a few tippling hats kept by slaves, for the accommodation of Greeks and the poorer sort of travellers, where anything may be had for money. Here are bagnios, or public baths, in the same manner as in Turkey, at a very moderate rate. The women have baths of their own, where the men dare not come. Without the city there are a great number of sepulchres, as also cells or chapels, dedicated to matrons, or reputed saints, which the women go to visit every Friday. The Turkish soldiers are great tyrants: for they not only turn others out of the way in the streets, but will go to the farmhouses in the country for twenty days together, living on free quarters, and making use of every thing, not excepting the women. The Algerines seat, as in Turkey, sitting crooks-legged round a table about four inches high, and use neither knives nor fork; before they begin, every one says Bismile Allah, "In the name of God." When they have done, a slave pours water on all their hands as they sit, and then they wash their mouths. Their drink is water, sherbet, and coffee. Wine is not allowed, though drank immoderately by some. The prospect of the country and sea from Algiers is very beautiful, being built on the declivity of a mountain: but the city, though for several ages it has been stormy of the greatest powers in Chrifendom, it is said, could make but a faint defense against a regular siege; and that
that three English fifty-gun ships might batter it about the ears of its inhabitants from the harbour. If so, the Spaniards must have been very deficient either in courage or conduct. They attacked it in the year 1775, by land and by sea, but were repulsed with great loss; though they had near 20,000 foot and 2000 horse, and 47 king's ships of different rates and 346 transports. In the year 1783 and 1784, they also renewed their attacks by sea to destroy the city and galleries; but, after spending a quantity of ammunition, bombs, &c. were forced to retire without either its capture or extinction. The mole of the harbour is 500 paces in length, extending from the continent to a small island where there is a cape and large battery.

E. Long. 3. 30. N. Lat. 36. 40.

ALGOL, a fixed star of the third magnitude, called Nielus's Head, in the constellation Perseus; its longitude is 21° 50' 42" of Taurus, and its latitude 23° 23' 47" north, according to Flamsteed's catalogue. For an account of its changes, period, and other circumstances, see Astronomy (Index.)

ALGONQUINS, a nation in North America, who formerly polluted great tracts of land along the north shore of the river St Lawrence. For a long time they had no rivals as hunters and warriors, and were long in alliance with the Iroquois, among whom they agreed to protect from all invaders, and to let them have a share of their venison. The Iroquois, on the other hand, were to pay a tribute to their allies, out of the culture of the earth; and for them all the menial duties, such as flaying the game, curing the flesh, and dressing the skins. By degrees, however, the Iroquois associated in the hunting matches and warlike expeditions of the Algonquins; so that they soon began to fancy themselves as well qualified, either for war or hunting, as their neighbours. One winter, a large detachment of both nations having gone out a-hunting, and encamped, as they thought, a vast quantity of game, six young Algonquins and as many Iroquois were sent out to begin the slaughter. The Algonquins, probably became a little jealous of their associates, upon seeing a few elk, the Iroquois to return on pretence that they would have sufficient employment in slaying the game they should kill; but after three days hunting, having killed none, the Iroquois exulted, and in a day or two privately set out to hunt for themselves. The Algonquins were so exasperated at seeing their rivals return laden with game, that they murdered all the hunters in the night-time. The Iroquois intimidated their resentment; but in order to be revenged, applied themselves to study the art of war as practiced among those savage nations. Being afraid of engaging with the Algonquins at first, they tried their prowess on other inferior nations, and, when they thought themselves sufficiently expert, attacked the Algonquins with such diabolical fury, as shewed they could be satisfied with nothing less than the extermination of the whole race; which, had it not been for the interposition of the French, they would have accomplished. — The few Algonquin nations that are now to be seen, seem entirely ignorant of agriculture, and infidant by fishing and hunting. They allow themselves a plurality of wives; to withstanding which, they daily decrease in population, few or none of their nations containing above 6000 souls, and many of them not 2000. Their language is one of the three radical ones in North America, being understood from the river St Lawrence to the Multifippi.

ALGOR, with physicians, an unusual coldness in any part of the body.

ALGORITHM, an Arabic word expressive of numerical computation.

ALGUAZIL, in the Spanish polity, an officer who Blacked in the decrees of a judge executed.

ALHAGI, in botany, the trivial name of a species of hedyarum. See HEDYSARUM.

ALHAMBRA, a very pleasant town of the kingdom of Granada, in Spain, situated in the midst of some craggy mountains, about 25 miles S. W. of Granada, on the banks of the Rio Frio, in W. Long. 10. 10. N. Lat. 36. 59. and having the finest warm baths in all Spain. It was taken from the Moors in 1481. — The inhabitants, though surprized, and the town without a garrison, made a gallant defence: but being at length forced to submit, the place was abandoned to the pillage of the Christian soldiers; who, not satisfied with an immense quantity of gold and jewels, made slaves of upwards of 3000 of the inhabitants.

ALHAMBRA, the ancient fortresses and residence of the Moorish monarchs of Granada. It derives its name from the red colour of the materials which it was originally built with, Alhambra signifying a red house. It appears to a traveller a huge heap of as ugly buildings as can well be seen, all huddled together, seemingly without the least intention of forming one habitation out of them. The walls are entirely unornamented, all gravel and pebbles, daubed over with plaster by a very coarse hand; yet this is the palace of the Moorish kings of Granada, indubitably the most curious place within that exists in Spain, perhaps in the world. In many countries may be seen excellent modern as well as ancient architecture, both entire and in ruins; but nothing to be met with anywhere else can convey an idea of this edifice, except the decorations of an opera, or the tales of the genie.

Paving round the corner of the emperor's palace, one is admitted at a plain unornamented door in a corner. On my first visit, says Mr. Swinburne, I confess I was struck with amazement, as I Rept over the Spain, threshold, to find myself on a sudden transported into a species of fairy land. The first place you come to is the court called the communa or del mezquitar, that is the common baths, an oblong square, with a deep basin of clear water in the middle; two flights of marble steps leading down to the bottom; on each side a parterre of flowers, and a row of orange-trees. Round the court runs a peristyle paved with marble; the arches bear upon very flight pillars, in proportions and style different from all the regular orders of architecture. The ceilings and walls are incrusted with fret-work in stucco, so minute and intricate, that the most patient draughtsman would find it difficult to follow it, unless he made himself master of the general plan. This would facilitate the operation exceedingly; for all this work is frequently and regularly repeated at certain distances, and has been executed by means of square moulds applied faceeffectively, and the parts joined together with the utmost nicety. In every division are Arabic sentences of different lengths, most
of them expressive of the following meanings: "There is no conqueror but God," or, "Obedience and honour to our Lord Abouabdoula." The ceilings are gilt or painted, and time has caused no diminution in the freshness of their colours, though constantly exposed to the air. The lower part of the walls is disposed in gilt, finer than any thing else that he had ever seen, must afford a stranger the most agreeable fenthions while he treads this magic ground. The porches at the ends are more like groito-work threatening you of them that they might enter into the court at the two extremities. The squirels painted with coloured tiles; the colonnade with white marble. The walls are covered five feet up from the ground with blue and yellow tiles, disposed chequerwise. Above and below is a border of small effentchoes, enamelled blue and gold, with an Arabic motto on a band; signifying, "No conqueror but God." The columns that support the roof and gallery are of white marble, very slender, and fantastically adorned. They are 9 feet high, including base and capital, and 8 inches diameter. They are very irregularly placed; sometimes singly, at others in groups of three, but more frequently two together. The width of the horse-shoe arches above them is four feet; two inches for the large ones, and three for the smaller. The ceiling of the portico is finished in such manner and more complicated manner than that of the commans, and the two are laid on the walls with inimitable delight. In the ceiling it is so artfully fosled and handled as to exceed belief. The capitals are of various designs, though each design is repeated several times in the circumference of the court, but not the least attention has been paid to placing them regularly or opposite to each other. Not the slightest representation of animal life can be discovered amidst the varieties of foliages, grotesques, and strange ornaments. About each arch is a large square of arabesques, surrounded with a rim of characters, that are generally quotations from the Koran. Over the pillars is another square of delightful filigree work. Higher up is a wooden rim, or kind of cornice, as much enriched with carving as the stucco that covers the part underneath. Over this projects a roof of red tiles, the only thing that disfigures this beautiful square. This ugly covering is modern, put on by order of Mr Wall, the late prime minister, who a few years ago gave the Alhambra a thorough repair. In Moorish times, the building was covered with large painted and glazed tiles, of which some few are still to be seen. In the centre of the court are twelve ill-made lions muzzled, their fore parts smooth, their hind parts rough, which bear upon their backs an enormous bason, out of which a lesser rives. While the pipes were kept in good order, a great volume of water was thrown up, that falling down into the basons, passed through the beasts, and issued out of their mouths into a large reservoir, where it communicated by channels with the jet d’eaus in the apartments. This fountain is of white marble, embelished with many festoons and Arabic detached, thus translated:

"Seest thou not how the water flows copiously like the Nile?"

"This resembles a sea washing over its shores, threatening shipwreck to the mariner."

"This water runs abundantly, to give drink to the lions."

"Terrible as the lion is our king in the day of battle."

"The Nile gives glory to the king, and the lofty mountains proclaim it."

"This garden is fertile in delights: God takes care that no noxious animal shall approach it."

"The fair princes that walk in this garden, covered with pearls, augments its beauty so much, that thou may’st doubt whether it be a fountain that flows, or the tears of her admirers."

Palling along the colonnade, and keeping on the south side, you come to a circular room afbed by the men as a place for drinking coffee and forbes in. A fountain in the middle refreshes the apartment in summer. The form of this hall, the elegance of its copula, the cheerful distribution of light from above, and the exquisite manner in which the stucco is designed, painted, and finished, exceed all powers of description. Every thing in it inspires the most pleasing, voluptuous ideas; yet in this sweet retreat they pretend that Abouabdoula assembled the Abencerrages, and caused their heads to be struck off into the fountain. Continuing your walk round, you are next brought to a couple of rooms at the head of the court, which are supposed to have been tribunals, or audience-chambers.

Opposite to the Sala de los Abencerrajes is the entrance into the Terra de los Cariestones, or the tower of the two siffers; so named from two very beautiful pieces of marble laid as flags in the pavement. This gate exceeds all the rest in profusion of ornaments, and in beauty of prospect which it affords through a range of apartments, where a multitude of arches terminate in a large window open to the country. In a gleam of sunlight, the variety of tints and lights thrown upon this entable are uncommonly rich. The first hall is the concert room, where the women sit; the musicians played above in four balconies. In the middle is a jet d’eau. The marble pavement is equal to the finest existing, for the lizer of the flags and evenness of the colour. The two siffers, which give name to the room, are stobs that measure 15 feet by 71, without flaw or stain. The walls, up to a certain height, are mosaico, and above are divided into very neat compartments of stucco, all of one design, which is also followed in many of the adjacent halls and galleries. The ceiling is a fretted cove. To preserve this vaulted roof, as well as some of the other principal cupolas, the outward walls of the towers are raised 10 feet above the top of the dome, and support another roof over all, by which means no damage can ever be caused by wet weather or excessive heat and cold. From this hall you pass round the little myrtle-garden..."
The description of the Alhambra may be finished by observing how admirably everything was planned and calculated for rendering the place the most voluptuous of all retreats; what plentiful supplies of water were brought to refresh it in the hot months of summer; what a free circulation of air was contrived, by the judicious disposition of doors and windows; what shady gardens of aromatic trees; what noble views over the beautiful hills and fertile plains! No wonder the Moors regretted Granada; no wonder they still offer up prayers to God every Friday for the recovery of this city, which they efeem a terrestrial paradise. See Granada.

All, gives denomination to a seat, or division, among the Mahometans, who adhere to the right of succession of Ali the fourth caliph or successor of Mahomet, and to the return of Mahometanism introduced by him. The seflies of Ali are more particularly called abites; and (and opposed to the Sunnites, or feet of Omar, who adhere to the law as left by Mahomet, Abubeker, and Omar. Ali was cousin of Mahomet, and fon-in-law of that prophet, having married his daughter Fatimah. After Mahomet's death, great disputes arose about the succession. Many foid for Ali; but Abubeker was preferred, and elected the first kalif. Ali took his turn, after the death of Othman. — The Perfians are the chief adherents to the feet of Ali, whom they hold to have been the legitimate successor of Mahomet, and Abubeker, an usurper. On the contrary, the Turks are of the feet of Omar; and hold Ali in estimation, having raised a furious civil war among the Morifkans. The distinguishing badge of the followers of Ali is a red turban, which is worn by the Persians, who are hence called in derision, by the Turks, Albigachi, q. d. red-heads. Ali is reputed the author of several works, particularly a Centiloquium, in great esteem among the Arabs and Persians, part of which has been published in English by Mr. Ockley.

Aljameia is a name which the Morifkans in Spain give to the language of the Spaniards. Among other articles agreed on by the junio, which was appointed by the emperor Charles V. in 1520, in favour of the Morifkans, this was one, That the Morifkans should no longer speak Algareicia, i. e. Moorish or Arabic; but should speak Aljameia, i. e. Spanish, as it was called by the Moors, and all their writings and contradics should be in that language.

Alias, in law, a second or farther writ issued from the courts of Westminster, after a capias, &c. fled out without effect.

Alibi, in law, denotes the absence of the accused from the place where he is charged with having committed a crime; or his being otherwise, as the word imports, at the time specified.

Alcant, a large sea port town in the province of Valencia and territory of Segura. It is feated between the mountains and the sea, and has a wall deemed impregnable. The port is defended by three bastions furnished with artillery. To prevent the visits of the Algerine pirates, watch-towers were built to give notice of the approach of an enemy's ship. It was taken by the English in 1504. The castle was taken by the English in 1706; and held out a siege of two years before it was retaken by the French and Spaniards, and at last surrendered upon honourable terms.
A L I E N A T I O N, in law, denotes the act of making over a man’s property in land, tenements, etc., to another person.

Alienation in mortmain, is making over lands, tenements, etc., to a body-politic, or to a religious house, for which the king’s licence must first be obtained, otherwise the lands, &c. alienated will be forfeited.

Alienation in fee, is the selling the fee-simple of any land, or other incorporeal right. All persons who have a right to lands may generally alienate them to others; but some alienations are prohibited: such as alienations by tenants for life, &c., whereby they incur a forfeiture of their estate. By the statute of Edward I. a bar was put to alienations by which we call entail, which is an expedient for procuring perpetuities in families; but counter expedients were devised to defeat this intent, and a practice was introduced of cutting off entail by fines, and of barring remainders and reversions by recoveries. The statute for alienations in Henry VII’s time had a great effect on the constitution of England; as, among other regulations of that reign, it tended to throw power more into the hands of the people. By the statute 12 Car. II. cap. 24. fines for alienations are taken away. Crown lands are only alienable under a faculty of perpetual redemption. The council of Lateran held in 1123, forbade any clerk to alienate his benefice, prebend, or the like. By the laws of the ancient Jews, lands could only be alienated for the space of 50 years. At each return of the jubilee all returned again to the primitive owners, or their descendants, to whom the lands were originally allotted at the first distribution of Canaan.

Alienation Offices, is an office to which all writs of covenants and entry, upon which fines are levied, and recoveries suffered, are carried, to have fines for alienation set and paid thereon.

Aliment, (from aed to nourish), implies food both solid and liquid: from which, by the process of digestion, is prepared a very mild, sweet, and whitish liquor resembling milk, and distinguished by the name of chyle; which being absorbed by the lacteal veins, by them conveyed into the circulation, and there assimilated into the nature of blood, affords that supply of nutrition which the continual waste of the body is found to require.—Next to air, food is the most necessary thing for the preservation of our bodies: and as on the choice thereof our health greatly depends, it is of great importance to understand in general, what is the proper food for our nourishment; and in particular deviations from health, what is the best adapted to restore us. Our blood and juices naturally incline to become purulent and insipid: fresh chyle, duly received, prevent this destructive tendency, and preserves them in that mild state which alone consides with health. An animal diet affords the most of this bland nutritious viscid: watery fluids dilute the too gros parts, and carry off what is become unfit for use: It is only the small portion of jelly which is separated from the farinaceous parts of vegetables, that, after being much elaborated, is converted into the animal nature; yet the use of vegetables prevents both repletion and a too great tendency to a putrescent acrimony of the

merely very numerous in England, and so called from Alienation their belonging to foreign abbays.
A L I

Aliment. blood. In hot climates, as well as against the constitutional heat of particular poisons, vegetables are deemed in the largest proportions; animal substances afford the highest relish while our appetite continues; but will fatigue the appetite before the stomach is duly filled. Vegetables may be eaten after either fish or fowl: few herbs or fruits fatigue so much as that the stomach may not be filled with them, when it is already satisfied with flesh or fowl; whence it may be observed, that no diet which is very nourishing can be eaten to fullness, because its nutritious parts are oily and fattifying. Health depends almost wholly on a constant supply of the blood; and to preserve this a mixture of vegetables in some degree is always required, for a fast is soon the consequence of animal food alone: hot temperate habits, too, receive from milk and vegetables what is needful for correcting their excess; but in cold, pithy, and nervous habits, who want much nourishment from leaf digestion, and from the smallest quantity of food, animal diet is to be used more freely.

Thus much being offered as general principles with respect to the matter and quality of our aliment, the vaevodinarian may easily regulate his diet with some advantage to himself by an attention to the few ensuing particulars. In winter, eat freely, but drink sparingly: roast meat is to be preferred, and what is drunk should be stronger than at other seasons. In summer, let the thirst determine the quantity to be drunk; cold stomachs never require much; boiled meats and vegetables, if not otherwise contradicted, may now be more freely used. Lax habits require the winter’s diet to be continued all the year, and rigid ones should be confined to that of summer. Fat people should fast at times, but the lean should never do so. Those who are troubled with eructations occasioned by their food, should drink but little, and use some unaccommodated exercise. The thirsty should drink freely, but eat sparingly. In general, let moderation be observed; and the no dinner hath been had, a light supper is at all times to be preferred. After very high-seasoned meats, a glass of water acidulated with the acid elixir of vitriol, or in all weak stomachs the sweet elixir of vitriol, is far more almighty to the work of digestion than the common method of taking brandy. See further Food and Drink.

Obligation of Aliment, in Scots law, the natural obligation on parents to provide their children with the necessaries of life, &c. See Law, Part III. No. clxxiii. 4.

Alimentarii Partis, &c. were certain children maintained and educated by the munificence of the emperors, in a sort of public places, not unlike our hospitals. —Trajan was the first that brought up any of these alimentarii boys. He was imitated by Adrian. Antoninus Pius did the fame for a number of maidens, at the solicitation of Faustina; and hence, in some medals of that empress, we read Pveeliae Favstimiae. —Alexander Severus did the like at the request of Mammea; and the maids thus educated were called Mammceae.

Alimentary Duc or Canal, is a name given by Dr Tyfon and some others to that part of the body thro’ which the food passes, from its reception into the mouth to its exit at the anus; including the gula, stomach, and intestines. See Anatomy.

This duct has been said to be the true characteristic of an animal, or (in the jargon of the schools) in proportion to the size, physiology, and whatever has it being proportioned under the class of animals. Plants receive their nourishment by the numerous fibres of their roots, but have no common receptacle for digesting the food received, or for carrying off the recrement. But in all, even the lowest degree of animal life, we may observe a stomach and intestines, even where we cannot perceive the leaf formation of any organ of the fencles, unless that common one of feeling as in eyeflers. Phil. Trans. No. 269, p. 776, seq.

Dr Wallis brings an argument from the structure of the alimentary tube in man, to prove that he is not naturally carnivorous, to which Dr Tyfon makes some objections. V. Phil. Trans. No. 269, p. 777.

Alimontari, for alimentum, was an old law among the Romans, whereby children were obliged to find sustenance for their parents.

Alimony, in law, implies that allowance which a married woman fues for, and is intituled to, upon any occasional separation from her husband. See Law, Part III. No. clx. 13.

Alipilarius, or Alipillus, in Roman antiquity, a servant belonging to the baths, whose business it was, by means of waxen plasters, and an instrument called rostella, to take off the hairs from the armpits, and even arms, legs, &c. this being deemed a point of cleanliness.

Alipterium, abietius, in antiquity, a place in the ancient Palphare, where the athletes were accustomed before their exercises.

Aliquant Part, in arithmetic, is that number which cannot measure any other exactly without some remainder. Thus 7 is an aliquant part of 16; for twice 7 wants two of 16, and three times 7 exceeds 16 by 5.

Aliquot Part, is that part of a number or quantity which will exactly measure it without any remainder. Thus 2 is an aliquot part of 4; of 9; of 10, &c.

Alisanders, or Alexanders, in botany. See Snyrium.

Alisma, or Water-Plantain: A genus of the polygynia order, belonging to the herzaclia class of plants; and in the natural method ranking under the 5th order, Trapaetaloides. The characters are: The calyx is a three-leafed perianthium: the corolla consists of three roundish, large, flat, expanding petals: The flaminia consists of six subdivided filaments shorter than the corolla; the anthera are roundish: The pistillum consists of more than five germinas; the styli are simple, the stigma obtuse: The perciparium consists of compressed capsule: The seeds are small and follicary. Of this genus there are eight species, viz. The plantago, or great water-plaintain which grows in all the proper parts of Britain; the ranunculoides, or lesser water-plaintain; the ranas, or creeping water-plaintain; the damasamines, or star-headed water-plaintain, and all which are natives of Britain. The others, viz. the flava, cordifolia, subulata, and parafloria, are natives of America, where they are generally found in flagging waters, and other swampy places; so that it would be difficult to preserve them in Britain, for they will not live in the open.
ALKALI.

1. ALKALIS. 1. ALKALI. [460]

Properties common to all the alkaline salts.

1. They require a bog to make them thrive; but as they are plants of no great beauty or use, it is fearful how long they will continue to grow. 2. A river of Belgic Gaul, now Adige; which rising on the borders of Lorraine, and running through the duchy, waters the city of Luxemburg, and, swelled by other rivulets, falls into the Sea. 3. A river of the Alps, called the Aligardar. It is the city of Luxemburg, and, swelled by other rivulets, falls into the Sea. 4. A branch of Motazalites, and the former is now become as ridiculous as the philosopher's stone, the perpetuum mobile, &c.—It is likewise used by some authors for all fixed salts volatilized. 5. The Alkali, in chemistry, one of the general divisions of salts, comprehending that class of chemical elements which, by their union with acids, form perfect neutrals; in opposition to the salts formed of acids with metals or earths, which are volatile and folid masses in the fire, and which, when the salts are very pure, degenerate into absolute causticity, and would entirely destroy the organ of secession if long applied to it. 2. A tendency to diffuse animal substances, and reduce them to a gelatinous substance, which all of them will do when very strong. 3. An attraction for acids, with a power of separating them, and make them less, though previously combined with the same. 4. They change the blue vegetable juices to green; the green to yellow; the yellow to orange; the orange to red; and the red to purple. 5. They unite with oils, and destroy or caustic almost all kinds of colours that can be put upon cloth, whence their use in bleaching, &c.

2. Properties common to the two fixed alkalies.

1. They refulb the action of fire to a great degree, so that they can easily be reduced to a solid form by evaporating any liquid in which they happen to be dissolved. 2. By an intense fire, they flow into a liquid, which concretizes into a hard and solid mass in the cold. 3. When mixed in certain proportions with those earths or stones called vitrifiable, they melt, in a heat still more intense, into glasses. Mixed with ammoniacal salts, with animal substances, or with foot, they extricate a volatile alkali. The volatile alkali differs from the other two in being unable to refract the fire, and being entirely resoluble into an invisible and permanently elastic fluid, called by Dr. Priestley alkaline air. In consequence of this volatility, it always affects the olfactory nerves very perceptibly, and its smell is the general criterion by which its strength may be judged of. Its attraction toward acids, power of changing colours, &c. are also considerably weaker than those of the invariable alkali. Though two sorts of volatile alkali are commonly found under the names of spirits of hartshorn and of sal ammoniac, the one differs from the other only in its degree of purity. The former is called from its being originally made from the horns of deer; but this material has long been laid aside, and the bones of horses, the fints, as they are called, of the horns of cattle, the parings of hoofs, &c. have been substituted in their stead. This kind, however carefully prepared always contains a portion of animal oil, the smell of which is very perceptible; the other, prepared from pure sal ammoniac, is totally free of any empyrean-like smell, and is as pure as it can be obtained by any means whatever.

Effective with acids was formerly supposed to effervescence with acids to be a distinguishing property of alkalis, though it was always known that by a mixture with quicklime they might be deprived of this property. Dr. Black, however, has shown, that the effervescence with acids is no property of pure alkali, but is occasioned only by the escape of fixed air from it: of consequence, when quicklime is added, which attracts the whole or greatest part of the fixed air, no effervescence can be perceived. In the flate in which the fixed alkalis are commonly met with, indeed, effervescence with acids may be said to be an essential property; but this is entirely owing to the caustic just mentioned, viz. a quantity of fixed air, to which they are united during the process by which they were originally formed. The quantity of this air, however, is never so great as to saturate them entirely; on the contrary, their alkaline properties are always very perceptible, and they are commonly said to be in a mild state. But the truth is, that now they are in a kind of intermediate state between what may be called perfectly mild and perfectly caustic. In their perfectly mild state, they are united with such a large quantity of fixed air as entirely overpowers their alkaline properties; but this is entirely owing to the name of alkalis in this state, than when combined with the marine, nitrous, or any other acid; in which case the compounds are called neutral salts. But it is a much more laborious and tedious process to saturate an alkali completely with fixed air than with any other acid; nor does it very easily retain the aerial acid after it has once been combined with it. Hence the caustic taste and properties of the alkali are almost always predominant, and the salt contains a portion of pure and caustic alkali, to which alone its virtues are to be ascribed.

Vegetable alkali is obtained in its greatest purity by preparing deflagrating nitre with charcoal, provided we make use of the strow the nitrous acid. It is, however, a very difficult matter to adjust this proportion with sufficient accuracy; for if we employ too much charcoal, the salt will be considerably phlogisticated; if too little, some part of the nitre will remain undecomposed. Burnt tarr, therefore, purified by solution and filtration, may be looked upon as the best alkali we have. The common alkalis, or alkales as they are called, and said to be obtained from the ashes of vegetables, are always mixed
Alkali.

ed with much phlogiston, and sometimes with lime, salt, or other heterogeneous matters; for which reason they are not to be employed in the nicer chemical experiments, without being purified by solution in water, by filtration, and crystallization. The purity of all these salts is that called the blue pearl, imported from Hungary.

The vegetable alkali when thus purified, and containing near one half its weight of fixed air, is of a white colour when dry, with a very hot and caustic taste; possessing in an eminent degree all those qualities which have been ascribed to the alkaline salts in general. It runs per de liques when exposed to the air; and is usually incapable of being crystallized, though it acquires this property after being employed in the rectification of ardent spirits. It adheres more closely to acids than any substance hitherto discovered; though, from some experiments, Bergman was induced to believe that pure terra pomerana attracted acids still more powerfully. But it has been discovered by a mistake by Dr Withering, who, in a paper published in the 7th volume of the Philosophical Transactions, shows, that unless where the earth is united with vitriolic acid, not only the vegetable, the fossil, but even the volatile alkali in its pure or caustic state, will separate it from any other with which it may be combined. Terra pomerana, therefore, will always decompose vitriolated tartar, Glauber's salt, or vitriolic ammoniac; whence the mistake of this celebrated chemist probably has proceeded. After this alkali has been once united with marine acid, it appears to have undergone some change; for the salt then produced, by combining it with the vitriolic acid, resembles Glauber's salt almost as much as it does vitriolated tartar. It seems therefore to have made some approach towards the nature of fofill alkali; but chemists have not inquired what would be the consequence of repeated combinations of this kind.

The fofill alkali differs from the vegetable in having a smaller attraction for acids, in being more easily fusible by heat, and forming a more soluble compound with the vitriolic acid. It is also easily crystallizable, even without the addition of more fixed air than it naturally contains; and experience has determined it to be more proper for glasses or soap manufactures than the vegetable alkali; for which reason the demand for it is very considerable.

The fofill alkali was anciently called natron or nitre, and is spoken of by Pliny and Tacitus as an ingredient in glafs, &c. and the scriptures inform us that it was used in baths. The knowledge of this salt was lost in the general obfervation of science which took place on the decline of the Roman empire; and do we find it mentioned till the time of the P. B. H. P. G. B. P. H. P. G. B. P. H. P. G. B. P. H. P. G. B.

The vegetable alkali is commonly made use of in the material for the common caustic or bals infirmentis of the shops; for the preparation of which, see CHEMISTRY. Index. Both alkalis attract moisture from the air when reduced to a solid form in their caustic state, though neither the fofill alkali nor its combinations do so in any other; e. g. In their caustic state also they only unite with oils, or dilute in spirit of wine; which last
they have been supposed to purify, though it is more
than probable that they decompose and communicate
disagreeable qualities to it.

The volatile alkali, when procured immediately
by the distillation of any substance capable of yielding it,
is obtained in a state similar to that in which the alkalis
are usually met with, viz. half mild and half caustic.
By exposing the liquid alkali to a great quantity
of fixed air, we may at last have it perfectly mild and
neutralized; in which state it appears as a white salt
extremely volatile, though less so than the pure caustic
alkali. It dissolves very readily in water, but unless
some caustic spirit, or some lye or fixed alkali be added,
in order to abstract part of the fixed air, it will
s scarcely exhibit the characteristic of volatile alkali, viz.
a pungent and urinous smell. The addition of fixed air,
however, makes very little difference with regard to
the chemical combinations of this salt; for as fixed
air has a very slender power of acidity, it is expelled
by every other acid with the greatest ease, and the
same combinations formed as though it had not been
present. The only difference is, that when a mild alkali
is added to an acid, a strong effervescence takes
place by reason of the escape of the fixed air through
the liquid, while with the caustic alkali the mixture is
made quietly and without disturbance.

The various combinations of the alkaline fals with the
different acids, and the neutral compounds thence
resulting, are exhibited in the following table.

1. Vegetable fixed alkali combined with
   Vitriolic acid
   Nitrous acid
   Marine acid
   Acetous acid
   Acid of tartar
   Acid of borax
   Acid of phosphorus
   Saccharine acid, &c.
   Aerial acid

   forms
   Vitriolated tartar.
   Nitre.
   Sal digestivus.
   Terra foliata tartari.
   Soluble tartar.
   Anomalous salts, whose
   properties have not
   been ascertained.
   Mild or aerated alkali.

2. Fossil or mineral fixed alkali combined with
   Vitriolic acid
   Nitrous acid
   Marine acid
   Acetous acid
   Acid of tartar
   Acid of borax
   Acid of phosphorus
   Saccharine acid, &c.
   Aerial acid

   forms
   Glauber's salt.
   Cubicular nitre.
   Common salt.
   A salt resembling terra
   foliata tartari, but which
   does not deliquate.
   Rochelle salt.
   Borax.
   Unknown salts.
   Mild fossil alkali.

3. Volatile alkali combined with
   Vitriolic acid
   Nitrous acid
   Marine acid
   Acetous acid

   forms
   Vitriolic ammoniac, or
   Glauber's secret salt
   ammoniac.
   Nitrous ammoniac, or
   volatile nitre.
   Common salt ammoniac
   Spiritus mindereri.

Volatile alkali combined with
   Acid of tartar
   Acid of borax
   Acid of phosphorus
   Saccharine acid, &c.
   Aerial acid

   forms
   A salt whose properties
   have not been investiga-
   gated; which shoots
   into fine long crystals,
   and does not deliquate
   in the air.
   An anomalous salt.
   Microscopic salt, or ef-
   fential salt of urine.
   Anomalous salts.
   Volatile sal ammoniac, or
   salt of hartshorn.

Besides their attraction for acids, the alkalis have
also an attraction for oils, sulphur, and spirit of wine,
in the most way, when the salts are deprived of their
fixed air; and in this, as well as the dry way, with
several metals, and vitrifiable earths and flones, as has
been already mentioned.

With oil the vegetable fixed alkali forms a soap,
though less perfect than that made with the caustic
mineral alkali. When combined with fixed air they
s scarcely unite with oils. Boiled with sulphur, or melt-
ed in it with their dry state, they unite into a very
fetid compound called hispar sulphuris, which is soluble
in water, but totally and very quickly decomposed by
the contact of air. Vegetable alkali unites with iron,
tin, and zinc; corrodes copper, and runs with it into
a liquor of a deep blue colour, and joins with lead in
fusion. It does not act upon gold in its metallic state;
but if a sufficient quantity be added to a small solution of
gold in aqua regia, the cals of the metal will be first
precipitated and afterwards dissolved.

Vegetable alkalis a principal ingredient in the pow-
ders called fluxes, used for the fusion of metalline ores.
It promotes the fusion of earths, and forms glas with
the crystalline kind. It is soluble in an equal weight of
distilled water; and, when exposed to the air, it soon
attracts moisture from it and flows into a liquid.
In its caustic state it dissolves in spirits of wine, and
forms with it a red tincture called Van Helmont's
tincture of salt of tartar, formerly used both as an
internal and external remedy, but now fallen into dis-
repute.

Fossil alkali in its caustic state unites with oil into
an harder soap than that made with vegetable alkali.
With sulphur it forms a heavier sulphuris in the same
manner as the vegetable alkali, and yields a tincture
with spirit of wine, which dissolves part of the salt
while hot, but lets it fall again in a crystalline form
when cold. Gold, silver, or quicksilver, are not af-
fected by a solution of this salt; but copper and tin
are dissolved by it in the open air. It affects tin, lead,
regulus of antimony, and cobalt, slightly; but acts
powerfully upon zinc, and forms a kermes mineral
with crude antimony. Copper, iron, bismuth, zinc,
antimony, and regulus of cobalt, fused with two parts
of fossil alkali, are almost entirely dissolved in a very
strong heat; but tin, lead, and regulus of antimony,
treated in the same manner, only suffer a partial so-
fusion.

All the alkalis are of considerable use in medicine,
ALK [463] A L K

Though the particular virtues of vegetable and fossil alkali have not hitherto been properly ascertained. It is probable, however, that there must be a considerable diversity in their operations on the human body, as the vegetable alkali flows itself so much more acid and powerful than the fossil. As both of them unite immediately with acids, and change them into mild neutral salts; hence, if any of the strong mineral acids should fall upon any part of the human body, and begin to corrode and give pain, the immediate application of the lixivium turpic, or of a solution of any of those alkaline salts in water, or of the salts themselves in powder, will destroy their causticity, and prevent their doing further mischief: Or if any of these acids should drop on clothes, linen, or other substances, and alkaline salts are immediately applied, they will neutralize the acid, and prevent its further corrosion: Or if a person should, through halfake, swallow any other corroding salt which an alkali will decompose, the taking the lixivium turpic, or a solution of the alkaline salts, or the salts themselves in proper doses, are the most likely means of affording relief, it not given too late (a).

Both the vegetable and fossil alkali applied externally in a caustic state, first irritate and inflame the skin, and afterwards act as fire in mortifying and destroying it; and therefore have been much used by surgeons for opening buboes and other ulcers, and for eating away proud or fungous flesh that sprouts out from sores. Various formulæ of caustic alkalis have been employed for these purposes, of which an account is given under Chemistry and Pharmacy.

The alkaline salts, when much diluted with water, have been used as washes for removing pimples from the face; but if such washes are continued long, they are apt to spoil the skin. The ancient often used to dissolve tar (the fossil alkali) in their baths, and esteemed such baths useful for removing itchings of the skin, the fice, the impetigo, leprosy, and almost all sorts of cutaneous eruptions; and they employed baths of the same kind for promoting sweat, and for curing various disorders. They mixed it likewise with turpentine, with oils, and with fluids of various kinds, and rubbed or applied such compositions to the skin, for removing different complaints, to heal sores, to strengthen weak or relaxed parts, to destroy the poison of the bite of a mad dog, and of serpents; and they esteemed it as an antidote against many other poisons. It has been proved that alkaline salts preserve animal substances from putrefaction; on which account some practitioners have concluded that they act as strong antiseptic remedies when swallowed as medicines, and are taken up by the lachrymal vessels, and by them carried to the subclavian vein to be mixed with the blood. Experience, however, has shown that they have effects directly opposite, and that by dilating the vessels and quickening the circulation, they contribute towards the dissolution of the vital fluid; of which Dr Monro says he has seen several instances.

Alkalis promote the secretions in general particularly by the kidneys; but by the help of warm liquors and bed-clothes, their operation may be directed towards the skin. They have also been used in the cases of heartburn, and others where an acid prevails in the stomach and bowels, or where these organs are loaded with viscid phlegm. They are likewise given with a view to affright the operation of the bile when it is too weak and inert, either by themselves, or mixed with purgative or other medicines. The fossil alkali has been alleged to be a more powerful solvent of the human calculus than the vegetable, though perhaps without any just foundation. It is given from 7 to 20 grains three times a-day; and in some cases even to double that quantity. It may be taken in any common liquor, or in clear broth made of lean meat, from which the fat has been skimmed off; or the powdered salts may be made up in pills or boluses mixed with liqueurice powder, by means of mucilage of gum Arabic or conserve. In the vegetable alkali has been long used as a diuretic. Are of common droppings with great success; and Dr Monro informs us, that he has seen a number of cases of anafarea in which the water was carried off by it. As diuretics, it may be taken from ten grains to half a drachm, or more, two or three times a-day, mixed with some distilled water, syrup, broth, or water-gruel, or with two ounces of white wine, which partly neutralizes the salt. When added to infusions of juniper berries, broom tops, horse-radish, mustard-feed, winter's-bark, &c. in wine and beer, they prove powerful diuretics; and Dr Monro gives the following formula.

"Take bromptops, horse-radish, and juniper-berries, of each an ounce; bruise them in a stone or marble mortar; put them into a large wide-mouthed bottle, and add to them an ounce of salt of tartar, and two quarts of Rhenum wine. Infuse them for four days; decant off the wine, and filter it through paper for use. Two or three ounces may be taken three or four times a-day." Or, "Take an ounce of canella alba, and as much mustard-feed and juniper-berries; bruise them well in an iron mortar, and add an ounce of purified vegetable alkali with two quarts of porter; infuse for four days, and filter the liquor through paper; let the patient take a wine glassfully every four or six hours.

The diuretic powers of these medicines are sometimes increased by opium, and they have been successfully joined with essential oils and oilbams.

The most remarkable property of these salts, however, is that of dissolving the human calculus, for the lent solvent discovery of which, Mrs Stephens, in the year 1740, obtained a parliamentary reward of 5000l. At that time Dr Jurins being afflicted with the stone, tried a number of experiments on these medicines; from which he concluded, that their efficacy depended entirely on the

(a) With regard to the mineral acids, an exception seems to take place if oil of vitriol in its concentrated state should happen to be swallowed: for this contracts such a degree of heat on the contact of any aqueous fluid as would destroy the patient, independent of another cause. An instance we have seen where a person unhappily muflook a bottle of oil of vitriol for water in the night-time. He recovered by swallowing instantly a great quantity of milk. Another recovered by drinking a bottle of Florence oil.
the alkaline falls and lime which they contained and therefore he began to try what effects a soap-leaf would have on himself. At first he took only a few drops, but gradually increased this dose till he came to an ounce and sometimes an ounce and a half, in a proper vehicle, in 24 hours. This produced the discharge of a very small calculus, and relieved him of the symptoms of the stone. Dr. Harley, likewise, intoxicated under this complaint; and believing that the efficacy of Mrs. Stephens's medicines depended on the soap, lime, and alkaline falls which they contained, ordered a paste to be prepared for himself, made of eight ounces of soap, one of oyster-shell lime, a drachm of salt of tartar, and as much water as formed the whole into a soft mass; of which he took large quantities, and found himself greatly relieved, though not cured, as a stone was found in his bladder after his death. These and other instances of success, soon brought the medicines into general use: but though many found relief from them, others, particularly those who were afflicted with the stone, had all the symptoms of their distemper aggravated, by the falls rendering the blood, and other liquors of the body, particularly the urine, sharp and acid, so as to irritate and inflame the bladder, which was already in too irritable a state, from the confluent friction of the calculus lodged within it. The late experiments of Mr. Scheele and Sir Torbern Bergman, however, have made it evident, that the human calculus is composed of a concrete acid joined to a small portion of animal earth. Most people, however, have not been afflicted with the stone or gravel, with this corollary, to try the efficacy of these remedies, rather than submit to the dangerous operation of lithotomy; we shall therefore subjoin, from Dr. Monro, the following directions for making and using the soap-leaf.

**1.** Take of salt of tartar, eight ounces; of fresh quick-lime, four ounces; of distilled water, a quart: mix them all well together in a large bottle, and let them stand for 24 hours; then pour off the ley and filter it through paper, keeping it in well-stoppered vials for use. Of this the dose is from 30 drops to three or four drachms, which is to be repeated two or three times in the day.

**2.** One of the best methods of taking this ley is, to mix the quantity to be used in the day with three pints of plain broth, which has been made with the lean part of veal, with all the fat or oily parts separated from it, by putting it, when made, into a large bowl, and skimming off with a spoon when cold, and to drink, within an hour, a pint of this broth three times in the day—early in the morning—all day; and in the evening; and to continue the use of this medicine for three or four, or more months; and, during this course, to live on such things as least counteract the operation of the medicine: to take for breakfast some plain broth, such as has been described, with dry toasted bread or biscuit: or a dib or two of tea or coffee in place of the broth; for dinner to eat the lean part of plain boiled or roasted meat, or a fowl, with their own gravy or juice for sauce; and to eat only of vegetables which contain but little acid, such as potatoes, &c. and to use for drink toat and water, or water with a very small portion of spirit in it, and to abstain from eating fruit and acid or sweet vegetables, fat meat, butter, or oil; and from drinking wine, beer, cyder, punch, and in short from taking any thing which is likely to confound or depress the effects of the ley.

*With regard to the use of the soap-leaf, our author observes, "that he has seen a number of people who have taken it, both for gravelish complaints and for the stone; that many of those who had gravel were relieved, and some of them seemed to be cured; that some few of those who had the confirmed stone, received considerable relief for a time from its use: but the complaints after wards returned; nor can he say that one complete cure was made; though from the accounts given by the late Dr. Whytt of Edinburgh, and others, it should appear that this had sometimes happened; in many cases of stone the ley occasioned pain and irritation, and increased the violence of the symptoms so much, that the patients were obliged to lay it aside; and that this happened most frequently where the bladder seemed already to be diseased from the irritation of the stone: that at all times it is advisable to lay aside this medicine, at least for a time, whenever it irritates and occasions pain, or where there are appearances of its continued use having broken down the crafts of the blood."

Instead of the soap-leaf, the following solution of vegetable alkali, fully saturated with fixed air, has been lately recommended as a powerful solvent of the stone. *Take two ounces of salt of tartar, and dissolve it in two quarts of distilled water, and then saturate it fully with mixed air; and let the patient take eight ounces of it every eight hours.* If they have been related in which this medicine is said to have been serviceable, our author says he has seen only one gentleman who had taken it, and who had found considerable relief from it. Soap-leaf has likewise been recommended as a solvent of bilious calculi, and has sometimes been of service; but this has probably arisen more from its property of dissolving thick and viscid humours, and aiding the action of the bile, than by acting on the calculi themselves.

The volatile alkali has many of the virtues of the fixed, but affects animal substances, particularly in its virtues of the volatile brisk and strong stimulus to the nerves and fibres of living animals; and is therefore employed in ulcers where the pus boils and the circulation too languid; in low fevers, where the patient is in danger of sinking; in apoplectic and lethargic disorders of elderly people of phlegmatic habits, in paralytic cases, fainting fits, &c. where a brisk and stimulating remedy is wanted. It is often used as diaphoretic and sudorific in cases of rheumatism, in the end of fevers, catarrh, and other diseases, where a plentiful diaphoresis or sweat is required; and, according to our author, it is principally owing to this quality that the alkali have obtained their reputation of being efficacious remedies against the bites of serpents and other venomous animals. It is equally efficacious against mineral acid poisons with the fixed alkali.

It now remains only to give some account of the origin of the alkalis, or that process by which they are naturally produced. This subject, however, is very extensive, much involved in obscurity; nor has the origin of the alkalis, stear, been investigated with such diligence and success as that of the acids. Chemists have been divided in their opinions, whether alkaline falls be natural
Alkali.

tural bodies, or formed by the force of fire, uniting the principles of which they consist in the burning or distilling the substanccs from which they are got. It is generally supposed that they are formed by the force of fire intimately uniting an earth, an acid, and an inflammable matter together, so as to form an alkaline salt, which is supposed to be composed of these principles. In support of this opinion, it has been alleged, 1. That the fixed vegetable alkalii is produced by burning vegetables which contain the principle of fire, and by forming these salts; though no vestige of an alkali can be discovered in these vegetables in their natural state. 2. That the essential salts of vegetables, which contain an acid and an earth, on being calcined in a crucible with charcoal, yield an alkaline salt. 3. That by alternately allowing the vegetable alkali to remain delicium, and drying it again, it precipitates a quantity of earth, every time it is dissolved; so that the whole of the salt is at last reduced to this kind of earth, while the acid, phlogosion, &c. have evaporated, or been destroyed by the repeated application of heat for drying the salt. 4. In like manner the volatile alkali is produced by distilling animal substances, which contain the principles fit for producing it, though no marks of a volatile alkali could be discovered in these substances while they were fresh.

On the other hand, it has been asserted that the alkaline salts obtained by burning vegetables or distilling animal substanccs, existed originally in the materials from which they are produced, that they were generated in the plants by the process of vegetation, and freed by the fire from the other principles which distinguished them. In support of this opinion the following arguments are made use of by Neifira & Cie, Robenflie, Morvieux, &c. 1. That they had not been able to procure an alkaline salt by mixing earths, oil, and acids together, and subjecting them to the most intense fire. 2. The crysHals of tartar, which were formerly believed to be pure acid salts, have been found by late experiments to contain vegetable alkali. 3. The vegetable alkaline salt, when purified is always of the same nature, from whatever substance it is procured; and therefore must have been an original principle or body existing in the vegetables from which it is procured: for had it been produced by art, it would have varied, and we should have had different species of it, according to the principles which the plants contained. And, 4. The neutral salts which have been found mixed with the ashes of plants, as vitriolated tartrar, nirre, and sea-salt, are likewise strong proofs of the original existence of alkali in vegetables.

On this subject Dr. Monro observes, that hitherto we have not sufficient evidence to determine positively whether the vegetable alkali be produced by the force of fire, or if it existed originally in the substances from which it is prepared, though he is inclined to favour the former opinion. With regard to the volatile alkali, however, we have abundant evidence of it being produced from substances which could not possibly be supposed to contain it originally. Dr. Stahl affirms us, that if any dry fixed alkaline salt be well rubbed in a mortar with such a quantity of oil of turpentine, as is sufficient to make it of the consistence of a pulp, and digested for some weeks in a cucurbit or retort, we obtain a volatile alkali. Mr. Geoffrey relates, that having placed a large retort in a furnace, and adapted a
tubulated receiver to it, afterwards heating the bottom of the retort red-hot, he put into it, by means of a long tube rising from the upper part of the neck, a powder composed of equal parts of nirre and charcoal on which there came over into the receiver a liquor highly impregnated with volatile alkali. Cartheuer, in the first volume of his Materia Medica, tells us, that if two parts of salt of tartar be mixed with one of sulfur, and be afterwards distilled, they yield a volatile alkaline salt and spirit. Boerhaave and Macquer have both affirmed, that the vegetative process itself produces a volatile alkali; and that the juices got by bruising mustard-seed and other alkalifcent vegetables, as they are called, contain a volatile alkali which effervesces with acids: but this is denied by Cartheuer and Vogel, who affirm that they could discover no traces of volatile alkali in their juices by any experiments they made.

But whatever may be concluded from the experience of former chemists, the late discoveries of Dr. Priestley and Mr. Cavendish have decisively shown, that the volatile alkali is by no means a simple element or natural principle, but a compound, and which may be artificially prepared. Dr. Priestley informs us, that by the See Acid. See Air. union of nitrous air with iron, a volatile alkali is generated; and Mr. Cavendish, that by the action of the electric fluid, or pure elementary fire, upon phlogifitioned air, the nitrous acid is produced: the volatile alkali therefore, must be supposed to consist ultimately of phlogifitioned air united to a great quantity of elementary fire. In like manner, if we can suppose this subtle element to enter into the substance of any kind of earth in such a manner as to exert its peculiar action when that substance is applied to any other, we may reasonably conclude that the fixed alkalis also are not simple and permanent principles, but capable of artificial composition and decomposition. It is certain that the action of alkaline salts is extremely similar to that of fire; and as we know that this element is combined in a latent state with fluids, there can be no absurdity in supposing it capable of combining with solids.

Alkali, or Salt, in botany. See Salicornia.

Alkanet, in botany. See Anchusa.

Alkekengi, in botany, the trivial name of a species of physalis. See Physalis.

Alkena, in botany. See Lawsonia.

Alkermes, in pharmacy, a compound cordial medicine made in the form of a confection, deriving its name from the kermes-berries used in its composition.

Alkoran. See Alcoran.

All-Hallows. See All-Saints.

All-Cod. See Chenopodium.

All-Heal. See Heracleum and Stachys.

All-Saints, in the calendar, denotes a festival celebrated on the first of November, in commemoration of all the saints in general; which is otherwise called All-hallows. The number of saints being so excessively multiplied, it was found too bare to leave to dedicate a feast-day to each. In reality, there are not days enough, scarce hours enough, in the year, for this purpose. Hence an expedient was had recourse to, by commemorating such in the lump as had not their own days. Boniface IV. in the ninth century, introduced
The feast of All Saints in Italy, which was soon adopted into the other churches. All Saints, in the calendar, denotes a feast-day, held on the second of November, in commemoration of all the faithful deceased.—The feast of All Souls was first introduced in the eleventh century, by Odilo, abbot of Cluny, who enjoined it on his own order: but it was not long before it became adopted by the neighbouring churches.

All-Spice. See Myrtus and Calycanthus. All A, or Allan, the name by which the professors of Mahometanism call the Supreme Being.

The term Allatius Arabic, derived from the verb alab, to adore. It is the same with the Hebrew Eloah, which signifies the Adorable Being.

Allamanda, in botany: a genus of the monogynia order, belonging to the pentandria class of plants. The characters are: The calyx is five-leaf'd perianthus: The corolla consists of one funnel-shaped petal: the tube cylindrical: the border semiquincuncial and ventricose; the divisions expanding and obtuse: The stamens have four filaments: the anthers are five, arrow-shaped, converging, in the throat of the tube: The pistillum has an oval germin: girt at the base with an annular margin: the stylus is filiform, the length exceeding the tube: the stigma is bearded, and constricted in the middle: the pericarpium is an orbicular, compressed, brisht capsule, containing one cell with two valves: The seeds are imbricated, orbicular, flat, with a membraneous wing on the margin, and are very numerous. There is but one species, the cathartic, a native of Surinam.

Alantois, or Alantoides, a gut-shaped vesicle investing the forus of cows, goats, sheep, &c. filled with an urinous liquor conveyed to it from the uracus.—(See Comparative Anatomy). Anatomists are not agreed whether the alantois has any existence in the human species or not.

Allatus (Leo), keeper of the Vatican library, a native of Scio, and a celebrated writer of the 17th century. He was of great service to the gentlemen of Port Royal in the controversy they had with M-Clause touching the belief of the Greeks with regard to the eucharist. No Latin was ever more devoted to the s of Rome, or more inveterate against the Greek schismatics, than Allatus. He never engaged in matrimony, nor was he ever in orders; and pope Alexander VII. having asked him one day, why he did not enter into orders? he answered, “Because I would be free to marry.” The pope rejoined, “If so, who do you not marry?” “Because,” replied Allatus, “I would be at liberty to take orders.” Thus, as Mr Bayly observes, he passed his whole life, wavering between a parish and a wife; for, perhaps at his death, for having chosen neither of them; when, if he had fixed upon one, he might have repented his choice for 30 or 40 years.—If we believe John Patricius, Allatus had a very extraordinary pen, with which and no other, he wrote Greek for 40 years: and we need not be surprised, that, when he left it, he was so grieved, that he could scarce bear the crying. He published several manuscripts; several translations of Greek authors, and several pieces of his own composing. In his compositions he is thought to have more erudition than judgment: he used alla to make frequent digressions from one subject to another. He died at Rome in 1669, aged 83.

Allay. See Alloy.

Allegata, a word anciently subscribed at the bottom of rescripts and constitutions of the emperors; as sigata, or tefiata, was under other instruments.

Allegenis, or Allegias, a stuff manufactured in the East-Indies. There are two sorts of them: some are of cotton, and others of several kinds of herbs, which are spun like flax and hemp. Their lengths and breadth are of eight ells, by five, six, or seven-eighths, and of twelve ells, by three-fourths, or five-eighths.

Allegiance, is the tie, or ligament, which binds the subject to the government, in return for that protection which government affords the subject. The thing itself, or substantial part of it, is founded in reason and the nature of government; the name and the form are derived to us from ancient Gothic usage. Under the feudal system, every owner of land held them in subjection to some superior or lord, from whom or from whomsoever the tenant or vassal had received them: and there was a mutual trust or confidence subsisting between the lord and vassal, that the lord should protect the vassal in the enjoyment of the territory he had granted him, and on the other hand, that the vassal should be faithful to the lord, and defend him against all his enemies.

This obligation on the part of the vassal was called his feidelitas or fealty; and an oath of fealty was required by the feudal law to be taken by all tenants to their lord, which is couched in almost the same terms as the ancient oath of allegiance; except that, in the usual oath of fealty, there was frequently a favor or exception of the faith due to a superior lord by name, under whom the landlord himself was perhaps only a tenant or vassal. But when the acknowledgment was made to the absolute superior himself, who was vassal to no man, it was no longer called the oath of fealty, but the oath of allegiance, and therein the tenant swore to bear faith to his sovereign lord, in opposition to all men, without any favor or exception. Land held by this exalted species of fealty, was called feudum ligatum, a liege fee, the vassals homines ligati, or liege men; and the sovereign dominus ligatus, or liege lord. And when sovereign princes did homage to each other for lands held under their respective sovereignties, a distinction was always made between simple homag, which was only an acknowledgment of tenure, and liege homage, which included the fealty before-mentioned, and the services consequent upon it. In Britain, it becoming a settled principle of tenure, that all lands in the kingdom are held of the king as their sovereign and lord paramount, no oath but that of fealty could ever be taken to inferior lords; and the oath of allegiance was necessarily confined to the person of the king alone. By an easy analogy, the term allegiance was soon brought to signify all other engagements which are due from subjects to their prince, as well as those duties which were simply and merely territorial. And the oath of allegiance, as administered in England for upwards of 600 years, contained a promiss to be true and faith­ful to the king and his heirs, and truth and faith to hear of life and limb and terrane honos, and not to
Allegiance is know or hear of any ill or damage intended him, "without defending him therefrom." But, at the revolution, the terms of this oath being thought perhaps to favour too much the notion of non-resistance, the present form was introduced by the convention parliament, which is more general and indeterminate than the former; the subject only promising "that he will be faithful and bear true allegiance to the king," without mentioning "his heirs," or specifying in the least wherein that allegiance consists. The oath of supremacy is principally calculated as a renunciation of the pope's pretended authority: and the oath of abjuration, introduced in the reign of King William, very amply supplies the loose and general texture of the oath of allegiance; it recognizing the right of his majesty, derived under the act of settlement; engaging to support him to the utmost of the juror's power; promising to disclose all traitorous conspiracies against him; and expressly renouncing any claim of the descendants of the late pretender, in as clear and explicit terms as the English language can furnish. This oath must be taken by all persons in any office, trust, or employment; and may be rendered by two juries of the peace to any person whom they shall suspect of disaffection. And the oath of allegiance may be tendered to all persons above the age of twelve years, whether natives, denizens, or aliens.

But, besides these express engagements, the law also holds that there is an implied, original, and virtual allegiance, owing from every subject to his sovereign, antecedently to any express promisive, and although the subject never swore any faith or allegiance in form. Thus Sir Edward Coke very justly observes, that "all subjects are equally bounden to their allegiance as if they had taken the oath; because it is written by the finger of the law in their hearts, and the taking of the corporal oath is but an outward declaration of the same."

Allegiance, both express and implied, is however distinguished by the law into two sorts or species, the one natural, the other local; the former being also perpetual, the latter temporary.

Natural allegiance is such as is due from all men born within the king's dominions immediately upon their birth. For immediately upon their birth, they are under the king's protection; at a time too, when (during their infancy) they are incapable of protecting themselves. Natural allegiance is, therefore, a debt of gratitude; which cannot be forfeited, cancelled, or altered, by any change of time, place, or circumstance, nor by any thing but the united concurrence of the legislature. A Briton who removes to France, or to China, owes the same allegiance to the king of Britain there as at home, and twenty years hence as well as now. For it is a principle of universal law, that the natural-born subject of one prince cannot by any act of his own, no, not by swearing allegiance to another, put off or discharge his natural allegiance to the former: for this natural allegiance was intrinsic, and primitive, and antecedent to the other; and cannot be divided without the concurrent act of that prince to whom it was first due.

Local allegiance is such as is due from an alien, stranger born, for so long time as he continues within the king's dominion and protection; and it ceases the infant such stranger transfers himself from one kingdom to another. Natural allegiance is therefore perpetual, and local temporary only; and that for this reason, evidently founded upon the nature of government. That allegiance is a debt due from the subject, upon an implied contract with the prince; that so long as the one affords protection, so long the other will demean himself faithfully.

The oath of allegiance, or rather the allegiance itself, is held to be applicable, not only to the political capacity of the king, or regal office, but to his natural person and blood-royal; and for the misapplication of their allegiance, viz. to the regal capacity or crown, exclusive of the person of the king, were the Spencers banished in the reign of Edward II. And from hence arose that principle of personal attachment and affectionate loyalty, which induced Englishmen in former times (and if occasion required, would doubtless induce their sons) to hazard all that was dear to them, life, fortune, and family, in defence and support of their liege lord and sovereign.

It is to be observed, however, in explanation of this allegiance, That it does not preclude resistance to the king, when his misconduct or weakness is such as to make resistance beneficial to the community. It seems fairly provable, that the convention parliament, which introduced the oath of allegiance in its present form, did not intend to exclude all resistance; since the very authority by which the members sat together, was itself the effect of a successful opposition to an acknowledged sovereign.

Again: The allegiance above described can only be understood to signify obedience to lawful commands. If, therefore, the king should issue a proclamation, levying money or imposing any service or restraint upon the subject, beyond what the law authorized, there would exist no sort of obligation to obey such a proclamation, in consequence of having taken the oath of allegiance.

Neither can allegiance be supposed to extend to the king after he is actually and absolutely deposed, driven into exile, or otherwise rendered incapable of exercising the regal office. The promise of allegiance implies, that the person to whom the promise is made continues king: that is, continues to exercise the power, and afford the protection, which belong to the office of king; for it is the possession of these which makes such a particular person the object of the oath.

ALLEGORY, in composition, consists in choosing a secondary subject, having all its properties and circumstances resembling those of the principal subject, and describing the former in such a manner as to represent the latter. The principal subject is thus kept out of view, and we are left to discover it by reflection. In other words, an allegory is, in every respect, similar to an hieroglyphical painting, excepting only that words are used instead of colours. Their effects are precisely the same: At hieroglyphics rises two images in the mind; one, that represents one that is not seen: An allegory does the same; the representative subject is described, and the resemblance leads us to apply the description to the subject represented.

There cannot be a finer or more correct allegory than the following, in which the vineyard is made to represent God's own people the Jews:

"Thus
"Thou hast brought a vine out of Egypt; thou hast cast out the heathen, and plantest it. Thou didst cause it to take deep root, and it filled the land. The hills were covered with its shadow, and the boughs thereof were like the goodly cedars. Why hath thou then broken down her hedges, that all that pass do pluck her? The boar out of the wood doth waste it, and the wild beast doth devour it. Return, we beseech thee, O God of hosts: look down from heaven, and behold, and visit this vine and the vineyard thy right-hand hath planted, and the branch thou madest strong for thyself." Psal. lxxx.

Nothing gives greater pleasure than an allegory, when the representative subject bears a strong analogy, in all its circumstances, to that which is represented. But most writers are unlucky in their choice, the analogy being generally so faint and obscure, as rather to puzzle than to please. Allegories, as well as metaphors and similes, are unnatural in expressing any severe passion which totally occupies the mind. For this reason, the following speech of Macbeth is justly condemned by the learned author of the Elements of Criticism:

"Methought I heard a voice cry, Sleep no more! Macbeth doth murder Sleep; the innocent sleep; Sleep that knits up the ravell'd sleeve of Care, The birth of each day's life, fore labour's bath, Balm of hurt minds, great Nature's second course, Chief nourisher in life's feast."

Aft ii. Sc. 3.

But see this subject more fully treated under the article Metaphor and Allegory.

ALLEGRI. (Antonio), called Correggio from the place of his birth, an eminent historical painter, was born in the year 1494. Being descended of poor parents, and educated in an obscure village, he enjoyed none of those advantages which contributed to form the other great painters of that illustrious age. He saw none of the statues of ancient Greece or Rome; nor any of the works of the established schools of Rome and Venice. But Nature was his guide; and Correggio was one of her favourite pupils. To express the facility with which he painted, he used to say that he always had his thoughts ready at the end of his pencil.

The agreeable smile, and the profusion of grace, which he gave to his maidens, saints, and children, have been taxed with being sometimes unnatural; but still they are amiable and seducing: An easy and flowing pencil, an union and harmony of colours, and a perfect intelligence of light and shade, gave an astonishing relief to all his pictures, and have been the admiration both of his contemporaries and his successors. Annibal Caracci, who flourished 50 years after him, studied and adopted his manner of preference to that of any other master. In a letter to his cousin Louis, he expresses with great warmth the impression which was made on him by the first sight of Corregio's paintings: "Everything which I see here (says he) astonishes me; particularly the colouring and the beauty of the children. They live — they breathe. They smile with so much grace, so much reality, that it is impossible to refrain from smiling and partaking of their enjoyment. My heart is ready to break with grief when I think on the unhappy fate of poor Correggio — that so wonderful a man (if he ought not rather to be called an angel) should finish his days so miserably, in a country where his talents were never known!"

From want of curiosity or of resolution, or from want of patronage, Correggio never visited Rome, but remained his whole life at Parma, where the art of painting was little esteemed, and of condescension poorly rewarded. This concurrence of unfavourable circumstances occasioned at last his premature death at the age of 40. He was employed to paint the cupola of the cathedral at Parma, the subject of which is an allusion of the Virgin; and having executed it in a manner that has long been the admiration of every person of good taste, for the grandeur of design, and especially for the boldness of the fore-shortenings (an art which he first and at once brought to the utmost perfection), he went to receive his payment. The canons of the church, either through ignorance or baseness, found fault with his work; and although the price originally agreed upon had been very moderate, they alleged that it was far above the merit of the artist, and forced him to accept of the paltry sum of 200 livres; which, to add to the indignity, they paid him in copper money. To carry home this unworthy load to his indigent wife and children, poor Correggio had to travel six or eight miles from Parma. The weight of his burden, the heat of the weather, and his chagrin at this villanous treatment, immediately, threw him into a palsy, which in three days put an end to his life and his misfortunes.

For the preservation of this magnificent work the world is indebted to Titian. As he passed through Parma, in the suite of Charles V. he ran instantly to see the chef d'oeuvre of Correggio. While he was attentively viewing it, one of the principal canons of the church told him that such a grotesque performance did not merit his notice, and that they intended soon to have the work defaced. "Have a care of what you do (replied the other), if I were not Titian, I would certainly wish to be Correggio."

Correggio's exclamation upon viewing a picture by Raphael is well known. Having long been accustomed to hear the most unbounded applause bestowed on the works of that divine painter, he by degrees became less desirous than afraid of seeing any of them. One, however, he at last had occasion to see. He examined it attentively for some minutes in profound silence; and then with an air of satisfaction exclaimed, I am still a painter. — Julio Romano, on seeing some of Correggio's pictures at Parma, declared they were superior to any thing in painting he had yet beheld. One of these no doubt would be the famous Virgin and Child, with Mary Magdalene and St Jerome: But whether our readers are to depend upon his opinion, or upon that of Lady Millar, who in her Letters from Italy gives a very unfavourable account of it, we shall not presume to determine. This lady, however, speaks in a very different style of the no less famous Notre or Night of Correggio, of which she saw only a copy in the Duke's palace at Modena, the original having been sold for a great sum of money to the king of Poland. "It surpasses me very much (says she), to see how different the characters are in this picture from that which I already have described to you. The subject is a Nativity; and the extraordinary beauty of this picture proceeds from the clair obscur.
in the Revelation (xix. 1, 3, 4, 6) says, that he heard a great voice of much people in heaven, who said, Alleluia; and the four and twenty elders, and the four beasts, fell down and worshipped God that sat on the throne, saying, Alleluia. This hymn of joy and praise was transferred from the synagogue to the church. St. Jerome tells us, that at the funeral of Fabiola several psalms were sung with loud alleluias; and that the monks of Palestine were awakened, at their midnight watchings, with the singing of alleluias. So much energy has been observed in this term, that the ancient church thought proper to preserve it, without translating it either into Greek or Latin, for fear of impairing the genius and softness of it. The fourth council of Toledo has prohibited the use of it in times of Lent, or other days of fasting, and in the ceremonies of mourning: and, according to the present practice of the Romish church, this word is never repeated in church, nor in the offices of the dead; notwithstanding which, it is used in the crafts for the dead, according to the masarabic ritual, at the intone, when they sing, Tu es pater meus, Domine, Alleluia, in ter- ranam terrenam, Alleluia, Alleluia. The singing alleluia was oftentimes an invitational or call to each other to praise the Lord.

ALLEMAND a sort of grave solemn music, with good measure, and a slow movement. It is also a brisk kind of dance, very common in Germany and Switzerland.

ALLEMANNIC, in a general sense, denotes anything belonging to the ancient Germans. Thus, we meet with Allemannic history, Allemannic language, Allemannic law, &c.

ALLEN (John) archbishop of Dublin in the reign of King Henry VIII. was educated in the universities of Oxford; whence removing to Cambridge, he there took the degree of bachelor of laws. He was sent by Dr. Warden, archbishop of Canterbury, to the pope, about certain matters relating to the church. He continued at Rome nine years, and was created doctor of laws; either there or in some other university of Italy. After his return, he was appointed chaplain to Cardinal Wolsey, and was commissary or judge of his court as legate ad locum; in the execution of which office he was suspected of great dishonesty, and even perjury. He assisted the cardinal in living, and afterwards furnishing 40 of the smaller monasteries, for the erection of his college at Oxford; and that at Ipswich. The cardinal procured for him the living of Dalby in Leicestershire, though it belonged to the matter and brethren of the hospital of Burton Lazars. About the latter end of the year 1529, he was incorporated doctor of laws in the university of Oxford. On the 1st of March 1528 he was consecrated archbishop of Dublin, in the room of Dr. Hugh Inge deceased, and about the same time was made chancellor of Ireland. He wrote, 1. Epistola de Patribus significatione et passione; penned by him at the time when he received the archiepiscopal pall. 2. De confectioribus ac jurisdictione in viris conditores obsessoribus. He wrote also several other pieces relating to the church. His death, which happened in July 1534, was very tragical: for being taken in a time of rebellion by Thomas Fitzgerald, eldest son to the earl of Kilkenny, he was by his command most cruelly murdered, being
ALLEN (Thomas), a famous mathematician of the 16th century, born at Uttoxeter in Staffordshire the 21st of December 1542. He was admitted scholar of Trinity-college Oxford the 4th of June 1561; and in 1567 took his degree of master of arts. In 1570 he quitted his college and fellowship and retired to Gloucester-hall; where he studied very closely, and became famous for his knowledge in antiquity, philosophy, and mathematics. Having received an invitation from Henry earl of Northumberland, a great friend and patron of the mathematicians, he spent some time at the earl's house, where he became acquainted with those celebrated mathematicians Thomas Harriot, John Dee, Walter Warner, and Nathaniel Torporley. Robert earl of Leicester had a particular esteem for Mr Allen, and would have conferred a bishopric upon him, but his love of solitude and retirement made him decline the offer. His great skill in the mathematics made the ignorant and vulgar look upon him as a magician or conjurer: the author of a book intitled *Leicester's Comonwealth*, has accordingly accused him with using the art of figuring, to procure the earl of Leicester's unlawful designs, and endeavouring by the black art to bring about a match betwixt him and Queen Elizabeth. But without pretending to point out the absurdity of the charge, it is certain that the earl placed such confidence in Allen, that nothing material in the state was transacted without his knowledge; and the earl had confiant information, by letter, from Mr Allen, of what passed in the university. Mr Allen was very curious and indefatigable in collecting scattered manuscripts relating to history, antiquity, astronomy, philosophy, and mathematics: these collections have been quoted by several learned authors, &c. and mentioned to have been in the Bibliotheca Alleniana. He published in Latin the second and third books of Claudius Ptolemy of Ptolemais, *Concerning the Judgment of the Stars*, or, as it is commonly called, of the Quaeripartite Confudition: with an exposition. He wrote also notes on many of Lilly's books, and some on John Bale's work *De Scriptoribus & Historiis*. Having lived to a great age, he died at Gloucester-hall on the 30th of September 1622.

ALLENDORF, a small town in the circle of the Upper Rinine, and in the landgrave of Heife-Cassel, remarkable for its fair-works and three stone-bridges. It is seated on the river Werfer, 15 miles east of Cassel: E. Long. 10. 5. N. Lat. 51. 26.

ALLER, a river which runs through the duchy of Lunenburg, and falls into the Weser a little below Verden.

Aller, good, in ancient writers. The word aller serves to make the expression of superlative signification. So, aller-good is the greatest good. Sometimes it is written aller.

ALLERION, or Alleron, in heraldry, a sort of eagle without beak or feet, having nothing perfect but the wings. They differ from martlets by having their wings expanded, whereas those of the martlet are close; and denote imperialisits vanquithed and disfamed; for which reason they are more common in French than in German coats of arms.

ALLESTRY (Richard, D. D.) an eminent divine, born at Uppington in Shropshire in March 1619, was educated in the grammar-school at Coventry, and afterwards at Christ-church in Oxford. His parts, which were extraordinary, were improved by a noble family. He took an arm for King Charles I. and was sometimes seen with his muller in one hand and his book in the other. He was very active in the service of King Charles II. before his restoration, and was employed by the royalists in transacting business with that prince during his exile; but was at last seized at Dover by a party of soldiers, and committed prisoner to Lambeth house, where he was confined fix or eight weeks; but soon after the restoration he was made canon of Christ-church, created doctor of divinity, and appointed chaplain in ordinary to the king, and regius professor of divinity. In 1665 he was appointed provost of Eton college, where he raised the school, which he found in a low condition, to an uncommon pitch of reputation. The west side of the outward quadrangle of that college was built from the ground at his expense. The excellent Dr Hammond, who was his intimate friend, left him his valuable library, which he himself afterwards bequeathed to his successors in the divinity chair. He was eminent for his piety, benevolence, and integrity; for the sincerity of his friendship, and his disinterested temper. He wrote several books; and a collection of his sermons were printed after his decease by Dr Fell bishop of Oxford. He died August 28. 1665.

ALLESTRY (Jacob), an English poet of the last century. He was the son of James Allenstr, a bookseller of London who was ruined by the great fire in 1666. Jacob was educated at Westminster school, entered at Christ-church Oxford, in the 6th term 1671 at the age of 18. and was elected student in 1672. He took the degree in arts; was music-reader in 1679, and terra flius in 1681; both which offices he executed with great applause, being esteemed a good philologist and poet. He had a chief hand in the verses and pastoralcs spoken in the theatre at Oxford May 21. 1681, by Mr. William Savile second son of the Marquis of Halifax, and George Cholmondeley second son of Robert vicount Kells (both of Christ-church), before James duke of York, his duchess, and the lady Anne; which verses and pastoralcs were afterwards printed in the "Examen Poeticum." He died October 15. 1686, and was buried in St Thomas's church-yard.

ALLEUVRE, a small brass Swedisch coin, worth about 1d. English money.

ALLEVIATION, denotes the making a thing lighter, and easier to bear or endure. It stands opposed to aggravation.

ALLEY (William), bishop of Exeter in the reign of queen Elizabeth, was born at Great Wycomb in Buckinghamshire. From Eton school, in the year 1528, he removed to king's-college Cambridge, where he took the degree of bachelor of arts. He also studied some time at Oxford; afterwards he married, was presented to a living, and became a zealous reformer. Upon queen Mary's accession he left his cure and retired into the north of England; where he maintained his wife and himself by teaching a school, and practising physic. Queen Elizabeth ascending the throne, he went to London, where he acquired great reputation by reading the divinity-lecture at St Paul's, and
in July 1560 was consecrated bishop of Exeter. He was created archbishop of Canterbury in 1581. He died on the 10th of April 1570, and was buried at Exeter in the cathedral. He wrote, 1. The
poet's Library, 2 vol. fol. Lond. 1571. These volumes contain twelve volumes on the first edition of
St. Peter's, read at St. Paul's. 2. A letter to Lord Burghley.

Whether it was ever published is uncertain. He translated the Pentateuch, in the version of the Bible which
was undertaken by queen Elizabeth's command.

Alley, in gardening, a straight parallel walk, bounded on both sides with trees, shrubs, &c. and
usually covered with gravel or turf.

Alley, among builders, denotes a narrow passage
leading from one place to another.

Alley, in perspective, that which, in order to have
a greater appearance of length, is made wider at the
entrance than at the termination.

Alley, in the new husbandry, implies the vacant space
between the outermost row of corn on one bed and the nearest row on it to the next parallel bed; and
it is usually about four feet in breadth, exclusive of the
partitions between the rows of corn in the beds.
The first hoeing of wheat is performed in the begin-
ning of winter, and the earth is ploughed away from
the rows into the intervals, which forms small ridges
in the middle between the double rows. The second
hoeing is in the spring, which turns it back to the
rows, leaving a furrow in the middle of the alley. The
third hoeing is from the rows, after the wheat has
blossomed; this turns the earth into the intervals,
forming small ridges there; as at the first hoeing.
The fourth hoeing returns the earth to the ridges, which
is performed a month or more after the third hoeing.

This commonly finishes the hoeing, if the land
is in good heart; otherwise one or two more hoeings
are necessary.

Alley (Edward), a celebrated English actor
in the reigns of queen Elizabeth and king James, and
founder of the college at Dulwich in Surrey, was born
at London, in the parish of St. Gobelin, Sept. 1, 1565, as
appears from a memorandum of his own writing.
Dr Fuller says, that he was bred a player; and
that his father would have given him a liberal
education, but that he was not turned for a serious course
of life. He was, however, a youth of an excellent
capacity, a cheerful temper, a tencious memory, a
sweet eloquence, and in his person of a stately port and
aspect; all which advantages might well induce a young
man to take to the theatrical profession. By several
authorities we find he must have been on the stage some
time before 1592; for at this time he was in high
favour with the town, and greatly applauded by the best
judges, particularly by Ben Johnson.

Haywood, in his prologue to Marlowe's Jew of Mal-
ta, calls him Proteus for shapes, and Roscius for a
tongue. He usually played the capital parts, and was
one of the original actors in Shakespeare's plays; in
some of Ben Jonson's he was also a principal perform-
er: but what characters he perforated in either of
these poets, it is difficult now to determine. This is
owing to the inaccuracy of their editors, who did not
print the names of the players opposite to the charac-
ters they performed, as the modern custom is; but gave
one general list of actors to the whole set of plays, as
in the old folio edition of Shakespeare; or divided one
from the other, letting the dramatic performances before
the plays, and the catalogue of performers after them,
as in Johnson's

It may appear surprising how one of Mr Alley's
production should be able to earn such an edifice as
Dulwich College, and liberally endow it for the main-
tenance of so many persons. But it must be observed
that he had some paternal fortune, which, though
small, might lay a foundation for his future influence;
and it is to be presumed, that the profits he received
from acting, to one of his provident and managing
disposition, and one who by his excellence in playing
drew after him such crowds of spectators, must have
considerably improved his fortune: besides, he was not
only an actor, but master of a playhouse, built at his
own expense, by which he is said to have amassed con-
 siderable wealth. He was also keeper of the king's
wild beasts, or master of the royal beaucharden, which
was frequented by vast crowds of spectators; and the
profits arising from these sports are said to have amount-
ed to 500l. per annum. He was thrice married; and
the portions of his two first wives, they leaving him
no issue to inherit, might probably contribute to this
benefaction. Such kind of donations have been fre-
quently thought to proceed more from vanity and of-
tention than real piety; but this of Mr Alley has
been ascribed to a very singular cause, for the devil has
been said to be the first promoter of it. Mr Aubrey
mentions a tradition, "That Mr Alleyn playing a de-
mon with six others, in one of Shakespeare's plays,
was, in the midst of the play, surprised by an ap-
carition of the devil, which so worked on his fan-
cy, that he made a vow, which he performed by
building Dulwich College." He began the foun-
dation of this college; under the direction of Inigo
Jones, in 1614; and the buildings, gardens, &c. were
finished in 1617, in which he is said to have expended
about 10,000l. After the college was built, he met
with some difficulty in obtaining a charter for settling
his lands in mortmain; for he proposed to endow it
with 8000l. per annum for the maintenance of one
master, one warden, and four fellows, three of whom
were to be clergymen, and the fourth a skilful or-
ganist; also six poor men, and as many women, besides
twelve poor boys to be educated till the age of four-
ten or sixteen, and then put out to some trade or call-
ing. The obfruction he met with arose from the lord
chancellor Bacon, who wished king James to settle part
of those lands for the support of two academical lec-
tures; and he wrote a letter to the Marquis of Buck-
ingham, dated August 18, 1618, intreating him to
use his interest with his Majesty for that purpose. Mr
Alley's solicitation was however at last complied with,
and he obtained the royal licence, giving him full pow-
er to lay his foundation, by his Majesty's letter-patent,
bearing date the 21st of June, 1619, by virtue whereof
he did, in the chapel of the said new hospital at Dul-
wich, called "The College of God's Gift," on the
1st of September following, publicly read and pub-
lished a quadruplicate writing in parchment, whereby
he created and established the said college; he then
subscribed it with his name, and fixed his seal to se-
veral parts thereof, in presence of several honourable
persons, and ordered copies of the writings to four
different
ALLEYNE was himself the first master of his college; so that to make use of the words of Mr. Haywood, one of his contemporaries, "He was so mingled with humility and charity, that he became his own petitioner, humbly submitting himself to that proportion of diet and clothes which he had bestowed on others." We have no reason to think he ever repented of this distribution of his substance; but on the contrary, that he was entirely tained, as appears from the following memorial in his own writing, found amongst his papers: "May 26, 1620—"My wife and I acknowledged the fine at the common plea bar, of all our lands to the college; blefted be God that he has given us life to do it." His wife died in the year 1623; and about two years afterwards he married on lady Kinchoe, who survived him, and received remarkable proofs of his affection, if at least we may judge of it by his will, wherein he left her considerably. He died Nov. 25, 1626, in the 61st year of his age, and was buried in the chapel of his new college, where there is a tomb-stone on his grave, with an inscription. His original Diary is also there preserved.

The following anecdote is entertaining in itself, and shows the high esteem in which Mr. Alleyne was held as an actor: "Edward Alleyne, the Garrick of Shakespeare's time, had been on the most friendly footing with our poet, as well as Ben Johnson. They used frequently to spend their evenings together at the sign of the Globe, somewhere near Black Friars, where the playhouse then was. The word need not be told, that the convivial hours of such a triumvirate must be pleasing as well as profitable, and may truly be said to be such pleasures as might bear the reflections of the morning. In consequence of one of these meetings, the following letter was written by G. Peck, a fellow of Christ-church college, Oxford, and a dramatic poet, who belonged to the Club, to one Marle, and intimate of his:

"Friend Marle,

"I must dey that my fython yr watch, and the cookery book you promysed, may be sente by the man. I never longed for thy company more than last night; we were all very merry at the Globe, when Ned Alleyne did not scruple to affyme pleasurably the friends' will, that he had stolen his speech about the Qualities of an actor's excellence; in Hamlet's Tryadegy, from conversations many fold which had passed between them, and opinions given by Alleyne touching the subject.---Shakespeare did not take this talk in good part; but Johnson put an end to the strife with wittyly re-markinge, This taffert needeth no Contention; you hole it from Ned, no doubt; do not marvel: Have you not seen him all times out of number? Believe me most sincerely, yours, G. Peck."

ALLIA, a river of Italy, which running down a very steep channel from the mountains of Cufiumum, mixes with the Tiber at 40 miles from Rome; famous for the great slaughter of the Romans by the Gauls, under Brennus; hence Alliatis dies, an unlucky day, (Virgil, Ovid, Lucan.) Our ancestors, says Cicero, deemed the day of the flight of Allia more fatal than that of taking the city.

ALLIANCE, in the civil and canon law, the relation contracted between two persons or two families by marriage.

Alliance is also used for a treaty entered into by sovereign princes and states, for their mutual safety and defence. In this sense, alliances may be distinguished into such as are offensive, whereby the contracting parties oblige themselves jointly to attack some other power; and into defensive ones, whereby they bind themselves to stand by and defend each other in case they are attacked by others.---Alliance, with the ancient Romans, though a sort of servitude, was much coveted. Ariarathes, we are told by Polybius, offered a substitute to the gods by way of thanking for having obtained alliance. The reason was, that thence-forwards people were sure not to receive any injuries except from them.---There were different sorts of alliances: some only united to them by a participation of the privileges of Romans, as the Latini and Hernici; others by their very foundation, as the colonies; others by the benefactions they received from them, as Mafimillas, Armenians, and Attalus, who owed their kingdoms to Rome; others by free treaties, which last by a long alliance became subjects, as the kings of Bithynia, Cappadocia, Egypt, and Kings of Greece: lastly, others by compulsory treaties, and the law of subjiction, as Philip and Antiochus. For they never granted peace to an enemy, without making an alliance with him; that is, they never subdued any people without using it as a means of subduing others.

The forms or ceremonies of alliances have been various in different ages and countries. At present, signing and swearing, sometimes at the altar, are the chief; anciently eating and drinking together, chiefly offering sacrifices together, were the customary rite of ratifying an alliance. Among the Jews and Chaldeans, beffers or calves; among the Greeks, bulls or goats; and among the Romans, hogs were sacrificed on this occasion. Among the ancient Arabs, alliances were confirmed by drawing blood out of the palms of the hands of the two contracting princes with a sharp stone, dipping herein a piece of their garments, and therewith smearing seven stones, at the same time invoking the gods Votans and Alliat, i. e. according to Herodotus, Bacchus and Urania. Among the people of Cholchis, the confirmation of alliances is said to be effected by one of the princes offering his wife's breasts to the other to suck, which he was obliged to do till there issued blood.

Alliance, in a figurative sense, is applied to any kind of union or connection; thus we say, there is an alliance between the church and state.

Alliati, in Roman antiquity, the balsam kind of flaves, who were usually kept fettered. The Romans had three degrees, or orders, of slaves or servants; the first employed in the management of their estates; the second in the mediocr or lower functions of the family; the third called alliati, above-mentioned.

Alligation, the name of a method of solving all questions that relate to the mixture of one ingredient with another. Though writers on arithmetic generally make alligation a branch of that science; yet, as it is plainly nothing more than an application of the common properties of numbers, in order to solve a few questions that occur in particular branches of business,
Alligation we choose rather to keep it distinct from the science of arithmetic.

Alligation is generally divided into medial or alternate.

**Alligation Medial.** From the rates and quantities of the simples given, discovers the rate of the mixture.

**Rule.** As the total quantity of the simples, 
To their price or value; 
So any quantity of the mixture, 
To the rate.

**Examp.** A grocer mixes 30 lb. of currants, at 4d. per lb. with 10 lb. of other currants, at 6d. per lb.: What is the value of 11 lb. of the mixture? 

\[ \frac{30 \text{ lb.}}{4 \text{ d.}} : \frac{10 \text{ lb.}}{6 \text{ d.}} = \frac{11 \text{ lb.}}{x \text{ d.}} \]

\[ x = \frac{11 \times 54}{40} = 16.5 \text{ d.} \]

**Note 1.** When the quantity of each simple is the same, the rate of the mixture is readily found by adding the rates of the simples, and dividing their sum by the number of simples. Thus,

Suppose a grocer mixes several sorts of sugar, and of each an equal quantity, viz. at 50s. at 54s. and at 60s. per cwt. the rate of the mixture will be 54s. 8d. per cwt.; for

\[ \frac{50 + 54 + 60}{3} = 54 \text{ s. 8d.} \]

**Note 2.** If it be required to increase or diminish the quantity of the mixture, say, As the sum of the given quantities of the simples, to the several quantities given; fo the quantity of the mixture proportioned, to the quantities of the simples fought.

**Note 3.** If it be required to know how much of each simple is an assigned portion of the mixture, say, As the quantity of the mixture, to the several quantities of the simples given; fo the quantity of the assigned portion, to the quantities of the simples fought.

Thus,

Suppose a grocer mixes 10 lb. of raisins with 30 lb. of almonds and 40 lb. of currants, and it be demanded, how many ounces of each sort are found in every pound or in every 16 ounces of the mixture, say,

\[ \frac{80}{10} : \frac{16}{2} = \text{raisins.} \]

\[ \frac{30}{16} : \frac{6}{2} = \text{almonds.} \]

\[ \frac{40}{16} : \frac{8}{2} = \text{currants.} \]

**Proof 16**

Note 4. If the rates of two simples, with the total value and total quantity of the mixture, be given, the quantity of each simple may be found as follows, viz. 
Multiply the lesser rate into the total quantity, subtract the product from the total value, and the remainder will be equal to the product of the excess of the higher rate above the lower, multiplied into the quantity of the higher-priced simple; and consequently the said remainder, divided by the difference of the rates, will give the said quantity. Thus,

Suppose a grocer has a mixture of 400 lb. weight, that cost him 7l. 10s. consisting of raisins at 4d. per lb.
Alligation. viz. 2 and 1, they are added; and the answer to the question is, that 2 lb. at 5d. 2 lb. at 7d. and 4 lb. at 10d. will make the mixture required.

The truth and reason of the rules will appear by considering, that whatever is lost upon any one branch is gained upon its yokc-fellow. Thus, in the above example, by selling 4 lb. of 10d. sugar at 8d. per lb. there is 8d. lost: but the like sum is gained upon its two yokc-fellows; for by selling 2 lb. of 5d. sugar at 8d. per lb. there is 6d. gained; and by selling 2 lb. of 7d. sugar at 8d. there is 2d. gained; and 6d. and 2d. make 8d.

Hence it follows, that the rate of the mixture must always be mean or middle with respect to the rates of the simples; that is, it must be less than the greatest, and greater than the least; otherwise a solution would be impossible. And the price of the total quantity mixed, computed at the rate of the mixture, will always be equal to the sum of the prices of the several quantities call’d up at the respective rates of the simples.

**Variety II.** When the question is limited to a certain quantity of one or more of the simples, this is called Alligation Partial.

If the quantity of one of the simples may be limited, alligate the branches, and take their differences, as if there had been no such limitation; and then work by the following proportion:

As the difference right against the rate of the simple whose quantity is given,
To the other differences respectively;
So the quantity given,
To the several quantities sought.

**Example.** A distiller would, with 40 gallons of brandy at 12s. per gallon, mix rum at 7s. per gallon, and gin at 4s. per gallon: How much of the rum and gin must he take, to fell the mixture at 8s. per gallon?

\[
\begin{array}{c|c|c|c|c|c}
\text{Gal.} & 30 & 30 & 120 & 144 & \text{total.} \\
\text{of wine.} & 0 & 6 & 24 & 0 & \\
\hline
\text{of water.} & 0 & 0 & 0 & 0 & \\
\hline
\text{Proof} & 144 & 4320 & (30) \\
\text{As} & 36 & : & 30 & : : & 144 & : 120 \\
\text{As} & 36 & : & 6 & : & 144 & : 24 \\
\end{array}
\]

There being here only two simples, and the total of the mixture limited, the question admits but of one answer.

ALLIGATOR, in zoology, a synonyme of the Lacerta crocodilus, See Lacerta.

ALLIOT, a star in the tail of the greater bear, much used for finding the latitude at sea.

Alliteration, an ornament of language chiefly used in poetry, and confisting in the repetition of the same letter at certain intervals. We do not remember to have ever seen any satisfactory account of alliteration in the writings of the critics. They seem to have placed it over in contemptuous silence; either as a false refinement or as a mere trite. It perhaps deserves a better fate. Many chapters have been composed on quantity, on the expression resulting from different arrangements of long and short syllables, and on the powers of pauses as they are variously placed, without a word of alliteration. This is the more extraordinary, as one should think it impossible for any man to examine minutely, and, as it were, dissect a number of verses, without perceiving the vast abundance of this ornament. It is as if an anatomist should publish a complete table of the arteries in the human body, and affect never to have seen a vein nor a nerve; for it may be affirmed, with small danger of mistake, that if you examine any number of verses, remarkable either for sweetness or for energy, you will be found in some degree alliterative. We do not pretend to say, that the sweetnefs and energy of verification depends chiefly on this circumstance, yet we cannot help believing that it may claim some share; for it is a constant appearance, as far as we have ever observed, that the poets whose fame is highest for verification, are most extensive dealers in this article.

The trifling poor appearance of the ornament itself, upon
Alliteration, and the frequent shade of it are circumstances indeed which give no encouragement to a serious inquiry into its nature and operation. How common is it for writers, who would be comic, when least likely for viewing a smile, to use alliteration with success? But, in the fine arts, no beauty nor grace is beyond the power of ridicule. The noblest attitudes in painting have been rendered laughable by caricature. St Paul preaching at Athens, in the design of Raphael, appears elegant, noble, and in some degree awful. The same apostle, represented by Hogarth in nearly the same attitude, pleading before the governor Felix, seems altogether ridiculous. So the language and verification of Milton in the Paradise Lost appear only proper for the most elevated subjects. In the Splendid Shilling of Philips, they appear equally proper for the lowest. So far it also with alliteration. Nor ought we to be morbid at the discovery, that much of the delight afforded by the language and beauty of Milton ill the common works of his verfificatlon; is it tor the ear.

The ear seems equally contemptible.

We apprehend the principal operation of this ornament to be quite mechanical. It is easier for the organs of speech to refraine, at short intervals, one certain conformation, than to throw themselves into a number of different ones, unconnected and discordant. For example, a succession of labials, interspersed at regular distances with dentals and gutturals, will be more easily pronounced than the succession of all the three at random. Sounds of which the articulation is easie, are most completely in the power of the speaker. He can pronounce them slowly or rapidly, softly or with force, at pleasure. In this we imagine the power and advantage of alliteration is founded: for we would not lay any stress on the pleasure which can result to the ear from the repetition of the same letter twice, or often, on the accented parts of a verse; for there are many other causes of pleasure, which, when thus detected and taken to pieces, seem equally contemptible.

These remarks might be confirmed and illustrated by numberless passages from the best poets. Some few lines will suffice, taken from Gray, who seems to have paid particular attention to this grace. He proceeded to have learned his verification from Dryden, as Dryden did from Spencer; and these three abound in alliteration above all the English poets. We choose Gray for another reason, in proof of what we mentioned before, that alliteration contributes not only to the sweetness, but also to the energy, of verification; for he uses it chiefly when his aim is at strength and boldness. In the Sifer Odor (as Dr Johnson styles them), almost every figure of speech commences and concludes with an alliterative line. The poet, we suppose, wished to begin with force, and end with dignity.

"Ruin feiz thee, ruthles king."

"To high-born Hoel's harp, or soft Llewellyn's lay."

"Wave the warp, and weave the woof,"

"Stamp weare vengeance deep, and ratiye his doom."

Alliteration is already in question; we might, however, have proceeded, as many of our ancient metrical poets did, from the simple assertion of the truth, to the demonstration of it. That it has a bearing on the subject is evident from the following passage: "The poet, we suppose, wished to begin with force, and end with dignity."

"Mountains, ye mourn in vain."

"Modest whole magic," — &c.

If alliteration thus contributes to enforce the expression of a poetical sentiment, its advantages in poetry must be considerable. If two words offer of equal propriety, the one alliterative the other not, we think the first ought to be chosen. We would compare this to the practice of fuguing in music. A composer who aims at expression will not hunt after fugues; but if they offer, if they seem to arise spontaneously from the subject, he will not reject them. So a good poet ought not to select an epithet merely for beginning with a certain letter, unless it suits his purpose well in every other respect; for the beauty of alliteration, when happy, is not greater than its deformity when affected. A couplet from Pope will exemplify both; the first line being bad, and the second good:

"Eternal beauties grace the rhining scene,

"Fields ever fresh, and groves for ever green."

Allium (from Latin, "to avoid or flumm," because many flumm the smell of it), Garlic: A genus of the monogynia order, belonging to the hexandria class of plants; and in the natural method ranking in the 9th order, Spathecaceae. The characters are: The calyx is a common spatha, roundish, withering, and multi-florous: The corolla consists of six oblong petals: The Stamina have six subulate filaments, often the length of the corolla; the antherae are oblong and erect: The Pistilum has a germin above, shorter, nearly three-cornered, with angles engraved with a line; the pistil are simple, the stigmatic acute: The pericarpum is a very short, broad, three-lobed capsule, with three cells and three valves: The seeds are many and roundish. Of this genus no fewer than 40 different species are enumerated by Linnaeus, among which he includes the cepa and porrum, or onions and leeks.

1. The fatum, or garlic, has a bulbous root, of an irregular roundish shape, with several fibres at the bottom; each root is composed of a number of lesser bulbs, called coves of garlic, inclosed in one common membranous
All the parts of this plant, but more especially the roots, have an acrimonious, and almost caustic taste, with a fiery offensive smell, which last has induced those who preferred some of the species in gardens on account of their yellow flowers, to eradicate them.

This pungent root warms and stimulates the solids, and attenuates tenacious juices; for which it is well adapted, on account of its being very penetrating; in so much that, when applied to the feet, its scent is soon discovered in the breath; and, when taken internally, its smell is communicated to the urine, or the matter of an illness, and perspires through the pores of the skin. Hence, in cold leucopneumogatic habits, it proves a powerful expectorant, diuretic, and emmenagogue; and, if the patient is kept warm, fudorific.

It is also of great service in humoral athermas and catarrhal disorders of the breast, and in other disorders proceeding from a laxity of the solids, and cold flagitious indispositions of the fluids. It is also frequently of service in the droopy, in the beginning of which it is particularly recommended by Sydenham, as a warm strengthening medicine; we have even many examples where it acts so powerfully as a diuretic, as to carry off all the water of dropies. It may be taken the length of a dram or two in substance for a dose. — There is a syrup and oxymel made with it, which may be employed for the same purposes as the garlic in substance; but they are mostly used in pulmonary disorders.

— It is applicable, if inflamed and ulcerates the skin, and is sometimes employed for this use in small-pox. It has also been recommended by Sydenham as a most powerful revolvent; for which purpose he was led to make use of it in the confinement small-pox. His method was to cut the root in pieces, and apply it, tied in a linen cloth, to the soles of the feet, about the eighth day of the disease, after the face began to swell; renewing it once a day till the danger was over. — When made into an unguent with oills, and applied externally, garlic is said to resolve and diffus cold tumours, and has been by some greatly celebrated in curaneous disorders.

The acrimonious qualities of this root, however, render it manifestly improper on many occasions. Its liberal use is apt to occasion head-ach's, flats and headaches, thirst, rebele heat, inflammatory distempers, and sometimes discharges of blood from the hemorrhoidal vesicles. In hot bilious constitutions, where there is already a degree of irritation, where the juices are too thin and acrimonious, or the viscera unfoad, it never fails to aggravate the distemper.

In Kamitchaka, the allium uritanum, or wild garlic, is very common and useful in medicine as well as food. Both Ruffians and natives gather it in great quantities for winter service. They steep it in water, then mix it with cabbage, onions, and other ingredients, and form out of them a ragout which they eat cold. It is also the principal remedy for the fourry. As soon as this plant appears above the snow, they seem to put this dreadful disorder at defiance, and find a cure almost in its worst stages.

Garlic is very hardy, and will thrive in almost any soil or situation. It is easily propagated either by the roots or seeds. If from the roots, they ought to be planted in autumn, that they may take good root in the ground before the spring, which is necessary to make them flower through the following summer. If they are propagated by seeds, they may be sown on a border of common earth, either in autumn soon after the seeds are ripe, or in the spring following; and will require no farther care than to keep them clean weeds. In the following autumn, they may be transplanted into the borders where they are to remain.

2. The ascalumnum, or echalot, was found wild in Palestine by Dr. Hafelquet. The root is conglobate, consisting of many oblong roots bound together by thin membranes. Each of these small roots sends forth two or three filiform, long, oval shaped leaves, issuing from a fistach, and are nearly like those of the common onion. The flower-heads spring from a membraneous fistach; is round, almost naked, and terminated by a globular umbel of flowers, which have crest, purplish, lance-shaped petals, of the length of the dimina. — The root of this species is very pungent, has a strong but not unpleasant smell, and therefore is generally preferred to the onion for making high-flavoured soups and gravies. It is also put into pickles, and in the East Indies they use an abundance of it for this purpose.

3. The scorodoprasum, or rokambolo, grows naturally in Denmark and Sweden. It has a heart-shaped solid root, which stands sidewise of the stalk. The leaves are broad, and are a little crenated on their edges. The flowers are of a pale purple colour, and collected into a globular head. The roots are used for the same purpose as the former.

4. The chobroeprasum, or chives, is an inhabitant of Siberia, and is a very small plant compared with the former, the leaves and stems seldom exceeding six inches in length, and the roots never producing any bulbs. The leaves are oval-shaped, hollow, and the stem naked. It was formerly in great request for mixing with salads in the spring, but has been little regarded lately. Its taste, smell, and virtues, are much the same as those of the common onion. It is propagated by parting the roots.

5. The cepa, or common onion, differs from the garlic only in the swelling pipy stalk, which is much larger in the middle than at either end. — From whence this was first brought into Europe is not known; but that it is natural to Africa is beyond a doubt, it being evident that onions were eaten by the Egyptians above 2000 years before Christ; and they make a great part of their constituent food to this day in Egypt. Dr. Hafelquet says it is not to be wondered at that the Israelites should long for them after they had left this place: for whoever had tasted onions in Egypt must allow, that none can be had better in any part of the universe. Here, he observes, they are sweet, in other countries they are nauseous and strong. Here they are soft; whereas in the north and other parts they are hard, and their coats so compact that they are difficult to digest. They eat them roasted, cut into four pieces, with some bits of roasted meat, which the Turks call kebab; and with this dish they are so delighted, that they wish to enjoy it in paradise. They likewise make a loop of them in Egypt, which Hafelquet says is one of the best dishes he ever eat. The many ways of dressing onions in Britain are known to every family: but in regard to wholeomenesses, there is certainly no method equal to boiling; as thus they are rendered mild, of easy digestion, and go off without leaving those heats in the stomach and bowels which
which they are apt to do any other way. Their nature is to attenuate thick, viscid juices; consequently a plentiful use of them in cold phlegmatic constrictions must prove beneficial. Many people, thus on account of the strong, disagreeable taste, they commonly cause to the breath. This may be remedied by eating a few raw parsley leaves immediately after, which will effectually overcome the scent of the onions, and cause them to lie more easy on the stomach.

The varieties are, the Sarburgh, the Spanish, and the Egyptian onion. They are propagated by seeds, which should be sown the latter end of February, or the beginning of March, on good, light, rich ground, well dug and levelled, and cleared from weeds. They should also be sown at a time when the surface of the ground is not moist; and where they are intended for a winter crop, they must not be sown too thick. The common allowance is six pounds of seed to an acre; though some allow more, in order to have a crop to draw out, which they call callings. In about six weeks after, the onions will be up and forward enough to hoe; at which time the weeds should be lightly cut up with a small hoe about two inches and a half broad, and as also the onions themselves where they grow too close. In bunches, leaving them at this first time at least two or three inches apart. This, if properly performed, and in a dry season, will preserve the ground clear of weeds at least a month, when they must be hoed over again, leaving them at this time about four or five inches farther. In six weeks after they must be hoed a third time. The weeds are now to be carefully cut up, and the onions fangled out so as to leave them about six inches square; by which means they will grow much larger than if left too close. This, if well performed, in case the weather proves dry, will keep the onions till they are fit to pull; but if the weather should prove moist, and any of the weeds take root again, the weeds must be pulled out with the hand; for the onions having now begun to bulb, must not be disturbed with a hoe. Towards the middle of August, the onions will have arrived at their full growth, which may be known by their blades falling to the ground, and their heads being formed. At this time, therefore, before their necks or blades are withered off, they should be drawn out of the ground, the extreme part of the blade cut off, and the onions laid upon a dry spot of ground, observing to turn them every other day at least, to prevent them from taking root again; which in moist weather they would be apt to do. At any rate, they are very apt to grow in the lofts where they are kept all winter; the most effectual method of preventing which is, with a hot iron, lightly to touch their heads or roots, which will effectually prevent their sprouting; but in doing this, great caution must be used not to touch the pulp, for that will cause them to perish soon after. In order to fave seeds, you must in the spring make choice of some of the largest, firmest and bell-shaped onions (in quantity proportionable to the seed you intend to fave), and having prepared a piece of good ground, which should be well dug, and laid out in beds about three feet wide, the onions must be planted in the beginning of March, in the following manner: Having stratified a lane of about four inches within the side of the bed, you must with a spade throw out an opening six inches deep, the length of the bed, into which you should place the onions with their roots downward, at about nine inches distance from each other; and with a rake draw the earth into the opening again to cover the bulbs: then proceed to move the line again about a foot farther back, where you must make an opening as before, and so again, till the whole is finished, by which you will have four rows in each bed; between each bed you must allow the space of two feet for an alley to go among them. In a month's time the leaves will appear above ground, and many of the roots will produce three or four flowers each. About the beginning of June, when the flowers begin to appear, the flowers must be tied to stakes to prevent them from being broke by their own weight. About the end of August the seeds will be ripe, which may be known by the opening of the cells which contain it, and its changing to a brown colour. When the heads are cut off, they should be spread abroad upon coarse cloths in the sun, observing to keep it under shelter in the night, as also in wet weather. When the heads are quite dry, the seeds should be beat out from them, and after being cleared from the husks, and exposed one day to the sun to dry, they may be put up in bags for use.

Besides the abovementioned sorts of onions, the scallions or c Babies, and Welsh onions, were formerly in great repute. The former is a root which never forms any bulbs at the roots, and was chiefly used in the spring for green onions; but is now become so scarce as hardly to be known. Some gardeners, instead of the scallion, substitute such onions as decay and rot in the house. These they plant in a bed early in the spring, and in a short time they become large enough for use. The true scallion is easily propagated by parting the roots either in the spring or autumn; but the latter is preferable. The roots should be planted three or four in a hole, and about six inches distance every way. The Welsh onions are propagated only for spring use; they never make any bulbs, and are therefore fit only to be used green for salads. They are sown in the end of July, in beds about three feet, and a half wide. In a fortnight's time they appear above ground; but in October their blades die, and the ground becomes quite naked. In January, however, they will again appear very strong, and in March will be fit to draw for young onions.

6. The porrum, or leek, has been so long cultivated, that its native place of growth cannot be traced. It is undoubtedly the same as that mentioned in the eleventh Chap. of Numbers, where it is said the Israelites longed for leeks in conjunction with onions. The leaves are much of the same nature as those of the latter, and they are yet a constant dish at the tables of the Egyptians, who chop them small and then eat them with their meat. They are in great esteem, too, with the Welsh, and their general use as a pot herb is well known. The culture is the same with that of the onion.

ALLX (Dr Peter), a learned French Protestant divine, born at Alençon in 1641. He became minister of the reformed church at Rouen, where he published many learned and curious pieces; the credit of which induced the reformed to call him to Charenton, about a league from Paris, being the principal church
they had in France. On the revocation of the edict of
Nantes, he retired to England; where he studied the
language with so much success, as to publish a work,
titled Reflections on the Books in the Holy Scriptures,
to establish the Truth of the Christian religion; 2 vols.;
which he dedicated to James II. acknowledging his
obligation to that prince, and his kind behaviour to
the distressed sufferers in general. He wrote several
other treatises relating to ecclesiastical history; which
rendered him as famous in England as in France, for
his ingenious and solid defences of the reformed reli-
gion. He was complimented with the degree of
D. D. and in 1690 was made treasurer of the church
of Salisbury. He died in 1717.

ALLOA, or ALLOWAY, a sea-port town in Scot-
land, situated on the Forth, about 20 miles higher up
the river than Leith, and five miles east of Stirling.
It is a populous place; has two market days in the
week; and is remarkable for its fine castle the seat of
the earl of Mar, and for the coal-mines near it. The
harbour is extremely commodious, with great depth
of water; and vessels are expeditiously loaded with
coals from the pits by an uncommon wagggon-way, on
which one horse draws with ease three waggons at
once, each wagggon containing a ton and a half. An
elegant dry dock has also been lately erected here,
capable of receiving ships of the greatest burden.
There is likewise a large glass-house for blowing bottles,
of which vessels are supplied with any quan-
tity upon the shortest notice.

The tower and lands of Alloa were exchanged by
David II. king of Scots, anno 1365, with Thomas
Lord Erskine, for the lands and estate of Strathgar-
ney in Perthshire; and since that time the castle of
Alloa has been the favourite residence of the family of
Mar. The situation is uncommonly beautiful. The
gardens here were the first that were laid out on a
great scale in Scotland; and, with the advice of Le
Nautre, were indebted to the taste of John the late
Earl of Mar, who began to plant them in the year
1706. They contain about 40 acres; and would have
exhibited to Dr Johnstoun, had he travelled that way,
as fine timber of four-score years growth as his favou-
rite England can produce.

The tower of Alloa is 89 feet in height, with walls
of 11 feet in thickness; and was built in the end of
the 13th century. In this residence of the family of
Erskine, many of the Scottish princes received their
education, having been for more than two centuries
the wards of the Lords Erskine and Earls of Mar;
who held generally the castle of Stirling, and frequent-
ly the three principal fortresses in that kingdom, Edin-
burgh, Stirling, and Dunbarton. The last heir of the
Scottish monarchy who was nurtured there was
Henry Prince of Wales; whose cradle, golf-clubs, and
other infantine and youthful remains, are preserved by
the heirs of the earls of Mar, in remembrance of that
spirited and promising prince; of whom Dr Birch has
preserved several anecdotes connected with the Erskines
and his residence at Alloa.—Among other remains of
antiquity preserved at Alloa, in remembrance of the
confidence and affection which subsisted always between
the Stuarts and the Erskines, is the private fogenet
of the unfortunate Mary, which she gave to the regent
Mar, after she was obliged by the treaty of Edinburgh
to yield from wearing the arms of England in the gift
quarter: the child's-chair of James I. her son; and
the fiddle-chair of Thomas Lord Erskine the 3d
Earl of Mar of the name, with the fashionable grace
carved on it, Salus Dei Honorem et Christo.

ALLOBROGES, in botany: a genus of the
monogynia order, belonging to the octandria clafs
of plants. The characters of which are: the calyx
is a four-leaved perianthium, with orbicular leaflets,
the opposite ones eaves: The corolla consists of four
orbiocular equal petals, less than the calyx; the claws
broader, the length of the smaller leaves of the calyx:
The stamina consist of eight slender filaments, the
length of the corolla; the antheræ are roundish: The
pilillum has a round didymous germain above; the
stylus is filiform, and longer than the stamina; and
the stigma is bised, with revolute divisions.

There is but one species, the zeulanicus, a native of Cey-
on.

ALLOTTING, or ALLENTMENT of Goods,
in matters of commerce, is when a ship's cargo is divided
into severall parts, bought by divers persons, whose names
are written on as many pieces of paper, which are ap-
plied by an indifferent person to the several lots or par-
cels; by which means the goods are divided without
partiality, every man having the parcel which the lot
with his name on is appropriated.

ALLOY, or ALAY, properly signifies a propor-
tion of a bairer metal mixed with a finer one. The
alloy of gold is estimated by carats, that of silver by
penny-weights. (See GOld, &c.) In different na-
tions, different proportions of alloy are used; whence
their moneys are said to be of the same fineness or
baseness, and are valued accordingly in foreign ex-
changes.—The chief reasons alleged for the alloying
of coin are: 1. The mixture of the metals, which, when melted from the mine, are not perfectly pure.
2. The paying the expense it must otherwise cost if they were to be refined. 3. The necessity of rendering them harder, by mixing some parts of other metals with them, to prevent the diminution of weight by wearing in passing from hand to hand. 4. The melting of foreign gold or coin which is alloyed. 5. The charges of coinage, which must be made good by the profit arising from the money coined. 6. And lastly, the duty belonging to the sovereign, on account of the power he has to cause money to be coined in his dominions.

In a more general sense, the word is employed in chemistry to signify the union of different metallic matters. As an infinity of different combinations may be made according to the nature, the number, and the proportions of the metallic matters capable of being alloyed, we shall not here enter into the detail of the particular alloys, all which are not yet nearly known. Those which are used, are brass, tombac, brassy, white copper, &c. may be found under their particular names; and what is known concerning other alloys may be found under the names of the different metals and semi-metals.

ALLUM. See Alum.

ALLUMINOR, from the French alumer, "to lighten," is used for one who coloureth or painteth upon paper or parchment; and the reason is, because he gives light and ornament by his colours to the letters or other figures. Such ornaments are called illuminations. The word is used in lat. R. III. cap. 9. But now such a person is called a limner.

ALLUSH, (anc. geog.) The Israelites being in the wilderness of Shur, departed from Dophkah, and went to Allush, from whence they proceeded to Rephidim; Num. xxxiii. 13, 14. Eusebius and St Jerom fix Alluh in Idumæa, about Gabaala or Petra, the capital of Arabia Petraæ. In the accounts of the empire, it is situated in the third Palestine; and by Ptolemy, among the cities of Idumæa.

Allusion, in rhetoric, a figure by which something is applied to, or understood of, another, on account of some similitude between them.

AlluVion, in law, denotes the gradual increase of land along the sea-shore, or on banks of rivers.

Also, in matters of policy, a sovereign prince or state that has entered into alliance with others. See Alliance.

Almacantars. See Almucantars.

Almacrossen, a sea-port town of Spain, in the province of Murcia, at the mouth of the river Guadalentin. It is about twenty miles west of Cartagena, and is remarkable for the prodigious quantity of alum found in its territory. W. Long. 1. 15. N. Lat. 37.

Almadie, a town of Spain, in the province of La Mancha, in the kingdom of Castile, situated upon the top of a mountain, where are the most ancient as well as the richest silver mines in Europe.

Almadie, a kind of canoe, or small vessel, about four fathoms long, commonly made of bark, and used by the negroes of Africa.

Almadie is also the name of a kind of long-boats, fized out at Calicut, which are eighty feet in length, and fix or seven in breadth. They are exceedingly swift, and are otherwise called catohirs.

Almagest, in matters of literature, is particularly used for a collection or book composed by Ptolemy, containing various problems of the ancients both in geometry and astronony.

Almagest is also the title of other collections of this kind. Thus Ricci-Ali has published a book of astronomy, which he calls the New Almagest; and Plucken, a book which he calls Almagestrum Botanicum.

Almagra, a fine deep red ochre, with some admixture of purple, very heavy, and of a denser yet friable structure, and rough dusty surface. It adheres very firmly to the tongue, melts easily and freely in the mouth, is of an astringent and strongly astringent taste, and stains the skin in touching. It is the sal ammoniac of the ancients; it furnishes very violently with acid menstruums; by which single quality, it is sufficiently distinguished from the sal sylviferum, to which it has in many respects a great similarity. It is found in immense quantities in many parts of Spain; and in Andalusia there are in a manner whole mountains of it. It is used in painting, and in medicine as an astringent.

Almagro, a fortress of Spain, the capital of one of the dioceses of La Mancha. It was built by the archbishop Roderic of Toledo, who finished it in 1214, and put a considerable garrison into it to refrain the incursions of the Moors. This was hardly done, when the fortress was beleaguered by an army of 5000 horse and foot, under the command of a Moorish officer of great reputation; but the prelate, its founder, took care to supply those within with such necessaries, that at length the enemy found themselves obliged to raise the siege and retire with great loss.

Almanack, a book, or table, containing a calendar of days and months, the rising and setting of the sun, the age of the moon, the eclipses of both luminaries, &c.—Authors are divided with regard to the etymology of the word; some deriving it from the Arabic particle al, and manah, to count; some from al-manah, new-year's gifts, because the Arabian astrologers used at the beginning of the year to make presents of their ephemerides; and others, from the Teutonic almanach, observations on all the months. Mr Johnson derives it from the Arabic particle al, and the Greek μή, a month. But the most simple etymology appears from the common spelling; the word being composed of two Arabic ones, Al Manack, which signify the Diary. All the classes of Arabs are commonly much given to the study of astronomy and astrology; both which a pastoral life, and a sort of husbandry, not only incline them but give them time and leisure to apply themselves to them. They never sow, reap, plant, travel, buy or sell, or undertake any expedition or matter, without previously consulting the stars, or, in other words, their almanacks, or some of the masters of them. From these people, by their vicinity to Europe, this art, no less useful in one sense than stupid and ridiculous in another, hath passed over thither; and those astronomical compositions have still everywhere not only retained their old Arabic name; but were, like theirs, for a long while, and still are among many European nations, interpolated with a great number of astrological rules for planting, sowing, bleaching, purging, &c. down to the cutting of the hair and paring of teeth.
Almanack of the nails.—Regiomontanus appears to have been the first in Europe, however, who reduced almanacks into their present form and method, gave the characters of each year and month, foretold the eclipses and other phæses, calculated the motions of the planets, &c. His first almanack was first published in 1474.

Almanacks differ from one another, entirely, in containing some more, others fewer, particulars.

The essential part is the calendar of months and days, with the risings and settings of the sun, age of the moon, &c. To these are added various parerga, astronomical, meteorological, chronological, political, rural, &c. as calculations and accounts of eclipses, solar ingresses, prognostics of the weather, tables of the tides, terms, &c. lists of pigs, offices, dignities, public institutions, with many other articles political as well as local, and differing in different countries.

A great variety are annually published in Britain; some for binding, which may be denominated book-almanacks; others in loose papers, called frezzi-almanacks.

The modern almanack answers to the Faust of the ancient Romans. See FASTI.

Confrontation of Almanacks. The first thing to be done is, to compute the sun's and moon's place for each day of the year, or it may be taken from some ephemerides and entered into the almanack; next, find the domical letter, and, by means therof, distribute the calendar into weeks; then, having computed the time of easter, by it fix the other moveable feasts; adding the immovable ones, with the names of the martyrs, the rising and setting of each luminary, the length of day and night, the aspects of the planets, the phases of the moon, and the sun's entrance into the cardinal points of the ecliptic; i.e. the two equinoxes and solstices. (See Astronomy, paffim.) By the help of good astronomical tables or ephemerides, the construction of almanacks is extremely easy.

In Britain almanacks for one year printed on one side of the paper, pay of the duty 2d.; those for more years pay for three years 1s. 6d.; but perpetual almanacks are to pay only for three years at 3d. Out of the duties by this act there shall be paid to each university L. 500 per annum half-yearly, at Midsummer and Christmas, and the surplus shall be paid into the exchequer to go to the sinking fund. Selling unsteamed almanacks incurs the same penalty as for selling unstamped newspapers. Almanacks in bibles and common prayer books are exempted.

Almanack, among antiquaries, is also the name given to a kind of instrument, usually of wood, inscribed with various figures and Runic characters, and representing the order of the feasts, domical letters, days of the week, and golden number, with other matters necessary to be known throughout the year; used by the ancient northern nations, in their computations of time, both civil and ecclesiastical. Almanacks of this kind are known by various names, among the different nations wherein they have been used; as rimstocks, primataries, runstocks, runtaffs, Seipiones Runic, Baccell Almanacs, clogs, &c. They appear to have been used only by the Swedes, Danes, and Norwegians. From the second of these people, their use was introduced into England, whence divers remains of them in the counties. Dr Plot has given the description and figure of one of these clogs, found in Staffordshire, under the title of The perpetual Staffordshire Almanack. The external figure and manner of these calendars appear to have been various. Sometimes they were cut on one or more wooden leaves, bound together after the manner of books; sometimes on the scabbards of swords, or even on daggers; sometimes on tools and implements, as portable sextoards, hammers, the handles of hatchets, fans, &c. Sometimes they were made of brass or horn; sometimes of the skins of eels, which, being drawn over a fick properly inleribbed, retained the impressions of it. But the most usual form was that of walking sticks, or ficks, which they carried about with them to church, market, &c. Each of these ficks is divided into three regions; whereas the first indicates the signs, the second the days of the week and year, and the third the golden number. The characters engraved on them are, in some, the ancient Runic; in others, the later Gothic characters of Ulfilus. The saints days are expressed in hieroglyphics, significant either of some endowment of the saint, the manner of his martyrdom, or the like. Thus, against the notch for the first of March, or St David's day, is represented a harp; against the 25th of October, or Crispin's day, a pair of shoes; against the 10th of August, or St Lawrence's day, a gridiron; and, lastly, against New-year's day, a horn, the mark of good drinking, which they gave a loose to at that feast.

Almanza, a little town of New-Castile, on the frontiers of the kingdom of Valencia in Spain, situated in W. Long. 1° 19'. N. Lat. 38° 54'. It is remarkable for the defeat of the allies in 1707, under the Marquis de las Minas and the Earl of Galway. In the beginning of this action, the English troops penetrated thro' the center of the Spanish army; but the Portuguese cavalry being broken by the Spaniards, and the French infantry making a dreadful fire on their flanks, the allied army was at last broken, and began their retreat when it was almost dark. Colonel Hill carried off the remains of thirteen battalions towards the river Xucar, which, if they could have passed, they might have been safe: but being very much fatigued, they were obliged to halt; by which means they were surrounded, and forced to surrender prisoners of war. In this battle, the allies lost 120 standards, together with all their artillery and baggage; a great number were killed, and several thousands taken prisoners. The Marquis de las Minas was dangerously wounded; and his miltrels, in the garb of an amazon, killed by his side. The earl of Galway had two cuts cross the face, which, though not dangerous, had prevented him from seeing, or giving orders properly.

Heresy of Almaric, a tenet broached in France by one Almaric, in the year 1200. It consisted in affirming, that every Christian was actually a member of Christ, and that without this faith no one could be saved. His followers went farther, and affirmed, that the power of the Father lapsed only during the continuance of the Mosaic law; that the coming of Christ introduced a new law; that at the end of this began the reign of the Holy Ghost; and that now confession and the sacraments were at an end, and that every one was to be saved by the personal and only Saviour, the Holy Spirit alone, without any external act of religion. Their morals were as infamous as their doctrine was
was absurd. Their tenets were condemned by a public decree of the council of Sens, in the year 1229.

**ALME, or ALMA**, singing and dancing girls in Egypt, who, like the Italian Improvisatori, can occasionally pour fourth "unpremeditated verse." They are called *Almés*, from having received a better education than other women. They form a celebrated society in this country. To be received into it, according to Mr. Savary, it is necessary to have a good voice, to understand the language well, to know the rules of poetry, and be able to compose and sing couplets on the spot, adapted to the circumstances. The Almés know by heart all the new songs. Their memory is furnished with the most beautiful tales. There is no festival without them; no entertainment of which they do not constitute the ornament. They are pantomime ballets, in which they represent the repast. They then descend into reserve, they refer to toxication. They are the Bacchants in a delirium. Their memory is furnished with the tales. They are (alled catarrh than other women. They form a circle of Tralos Montes, on the confines of Leon, where there was a very brisk action between the French and Portuguese in 1663; 17 miles N. W. of Cividal Rodrigo. W. Long. 7. 10. N. Lat. 40. 41.

**ALMEHRAB**, in the Mahometan custom, a rich in their mosquites, pointing towards the kebla or temple of Mecca, to which they are obliged to bow in praying. See KEBLA.

**ALMEISAR**, a celebrated game among the ancient Arabs, performed by a kind of casting of lots with arrows, strictly forbid by the law of Mahomet, on account of the frequent quarrels occasioned by it.

The manner of the game was thus: A young camel being brought and killed, was divided into a number of parts. The adventurers, to the number of seven, being met, 11 arrows were provided without heads or feathers; seven of which were marked, the first with one notch, the second with two, the third with three, &c. the other four had no marks. These arrows were put promiscuously into a bag, and thus drawn by an indifferent person. Tho' to whom the marked arrows fell, won shares in proportion to their lot; the rest to whom the blanks fell, were entitled to no part of the camel, but obliged to pay the whole price of it. Even the winners tailed not of the flesh themselves more than the loafers, but the whole was distributed to the poor.

**ALMENE**, in commerce, a weight of two pounds used to weigh saffron in several parts of the continent of the E. Indies.

**ALMERIA**, a sea-port town in the kingdom of Granada in Spain, pleasantly situated in a fine bay at the mouth of the river Almeria, on the Mediterranean; W. Long. 3. 20. N. Lat. 36. 51. This town is by some thought to have riven upon the ruins of the ancient Abdera, and was formerly a place of great consequence. It was taken from the Moors in 1147, by the emperor Conrad III. in conjunction with the French, Genoese, and Venetians. It was at that time the strongest place in Spain, held by the infidels; from which their privates, which were exceedingly numerous, not only troubled the sea-coasts inhabited by the Christians, but gave equal disturbance to the maritime provinces of France, Italy, and the adjacent islands. The city being well fortified, having a strong castle, a numerous garrison, and being excellently provided with everything necessary, made a vigorous resistance; but was at last taken by storm, when the visitor put to the sword all the inhabitants who were found in arms, distributing the best part of the plunder among his allies,

Vol. I.
lies, whom he sent away thoroughly satisfied. The Genevese, particularly, acquired here that emerald vefel which still remains in their treasury, and is deemed invaluable.

Upon its reduction by the Christians Almeria became a bishopric; but is at present very little better than a village, indiscriminately inhabited, and has nothing to testify so much as the probability of its former greatness, except certain circumstances which cannot be effaced even by the indolence of the Spaniards themselves. What these are, Udal ap Rhys, a Welshman, thus describes, in his tour through Spain and Portugal. "Its climate (says he) is so peculiarly blest, that one really wants words to express its excellence. Its fields and meads are covered with flowers all the year round; they are adorned also with palms, myrtles, plane-trees, oranges, and olives; and the mountains and promontories near it are as noted for their hills thence resorting in that fort of precious stones, infomuch that the next promontory to it is called the Cape of Gates, which is a corruption from the word agares, the hills thenceabounding in that sort of precious stones, as well as in emeralds and amethysts, granites or coarse rubies, and extreme curious alabaster in the mountains of Filanres." ALMISSA, a small but strong town at the mouth of the Cetina, in Dalmatia, famous for its piracies; ten miles east of Spalatro. E. Long. 39. 33. N. Lat. 42. 56.

ALMOND, the fruit of the almond-tree. See AMYGDALUS.

ALMOND, in commerce, a measure by which the Portuguese sell their oil; 26 almonds make a pipe.

ALMONDS, in anatomy, a name sometimes given to the glands, generally cited under the term of fat.

Almonds, among lapidaries, signify pieces of rock-crystal, used in adorning branch-candlesticks, &c. on account of the resemblance they bear to the fruit of that name.

ALMOND-Furnace, among refiners, that in which the flags of lathigre, left in refining silver, are reduced to lead again by the help of charcoal.

ALMONDBURY, a village in England, in the west-riding of Yorkshire, six miles from Halifax.

ALMONER, in its primitive sense, denotes an officer in religious houses, to whom belonged the management and distribution of the alms of the house. By the ancient canons, all monasteries were to spend at least a tenth part of their income in alms to the poor. The almoner of St Paul's is to dispose of the monies left for charity, according to the appointment of the donors, to bury the poor who die in the neighbourhood, and to breed up eight boys to singing, for the use of the choir. By an ancient canon, all bishops are required to keep almoners.

Lord a Loxsom, or Lord High Almoner, of England, is an ecclesiastical officer, generally a bishop, who has the forfeiture of all decodants, and the goods of felos de se, which he is to distribute among the poor. He has also, by virtue of an ancient custom, the power of giving the first dinner from the king's table to whatever poor person he pleases, or, instead of it, an alms in money.

Great Almoner, Grand Almonier, in France, is the highest ecclesiastical dignity in that kingdom. To him belongs the superintendency of all hospitals and houses of lepers. The king receives the sacrament from his hand; and he says mass before the king in all grand ceremonies and solemnities.

Almoner is also a more fashionable title given by some writers to chaplains. In this sense we meet with almoner of a regiment.

ALMONRY, or AUMBRY, the office or lodgings of the almoner; also the place where alms are given. See AUMBRY.

ALMS, a general term for what is given out of charity to the poor.

In the early ages of Christianity, the alms of the charitable were divided into four parts; one of which was allotted to the bishop, another to the priests, and a third to the deacons and subdeacons, which made their whole subsistence; the fourth part was employed in relieving the poor, and in repairing the churches.

No religious system is more frequent or warm in its exhortations to alms-giving than the Mahometans. The Alcoran represents alms as a necessary means to make prayer heard. Hence that laying of one of their khalifs: "Prayer carries us half-way to God, fasting brings us to the door of his palace, and alms introduces us into the presence-chamber." Hence many illustrious examples of this virtue among the Mahometans. Hafan, the son of Ali, and grandson of Mohammed, in particular, is related to have thrice in his life divided his substance equally between himself and the poor, and twice to have given away all he had. And the generality are so addicted to the doing of good, that they extend their charity even to brutes.

Alms, also, denotes lands or other effects left to churches or religious houses, on condition of praying the soul of the donor. Hence, Free Alms was that which is liable to no rent or service.

Reasonable Alms was a certain portion of the estates of intestate persons, allotted to the poor.

ALMS-Box, or Cheff, a small chest, or coffer, called by the Greeks κεφας, wherein anciently the alms were collected, both at church and at private houses.

The alms-cheff in English churches, is a strong box, with a hole in the upper part, having three keys, one to be kept by the parish or curate, the other two by the church-wardens. The erection of such alms-cheff in every church is enjoined by the book of canon, as also the manner of distributing what is thus collected among the poor of the parish.

ALMS-House, a petty kind of hospital, for the maintenance of a certain number of poor, aged, or disabled people.

ALMUCANTARS, in astronomy, an Arabic word denoting circles of the sphere passing through the centre of the sun, or a flat, parallel to the horizon, being the fame as PARALLELS of ALITUDE.

ALMUCANTARS-STAFF, is an instrument usually made of pear-tree or box, having an arch of 15 degrees; used to take observations of the sun, about the time of its rising and setting; in order to find the amplitude, and consequently the variation of the compasses.

ALMUCIUM, denotes a kind of cover for the head, worn chiefly by monks and ecclesiastics: It was of a figure
ALMUGIM, or ALMUG-TREE, a certain kind of wood mentioned in the first book of Kings, (x. 11.) which the vulgate translates ligna thyna, and the Septuagent wrought wood. The Rabbins generally render it coral; others, ebony, brazii, or pine. But it is observed, that the almug-tree can by no means be coral, because that wood is not fit for the purposes that the Scripture tells us the almug-tree was used, such as musical instruments, sthair-cafes, &c. The word thynun is a name for the citron-tree, known to the ancients, and very much esteemed for its sweet odour and great beauty. It came from Mauritania. The almug-tree, or almugim, or simply gummin, taking at for a kind of article, is therefore by the best commentators understood to be an oily and gummy sort of wood; and particularly that sort of tree which produces the gum ammoniac, which is also thought to be the same with the shittim-wood, whereof there is some frequent mention made by Moses.

ALMUNECAR, a sea-port town in the kingdom of Granada, seated on the Mediterranean, with a good harbour, defended by a strong castle, 20 miles south of Alhama. W. Long. 3. 45. N. Lat. 36. 50.

ALNAGE, or ALNAGE, the measuring of woollen manufactures with an ell. It was at first intended as a proof of the goodness of that commodity, and accordingly a feal was invented as a mark that the commodity was made according to the statute; but, being now possible to purchase these feals, they are affixed, whenever the vendor pleases, to all cloths indiscriminately, to the great prejudice of the British woollen manufactures.

ALNAGER, or ALNANGER, q. d. meafurer by the ell; signifies a sworn public officer, who by himself, or deputy, is to look to the affize of woollen cloth made throughout the land, i.e. the length, width, and work thereof; and to the feals for that purpose ordained. The office of king's alnager seems to have been derived from the statute of Richard I. A. D. 1197, which ordained, that there should be only one weight and one meafeure throughout the kingdom; and that the meafeody of the affize, or standard of weights and meafeures, should be committetl to certain persons in every city and borough. His business was, for a certain fee, to meafeure all cloth made for sale, till the office was abolished by the statute 11 and 12 W. III. cap. 20.

ALNUS, the ALDER-TREE, a species of betula. See Betula.

ALNICK, a thoroughfare town in Northumberland, on the road to Scotland. Here Malcolm, king of Scotland, making an inroad into Northumberland, was killed, with Edward his son, and his army defeated by Robert Mowbray, earl of this county, anno 1092. Likewise William, king of Scotland, in 1174, invading England with an army of 80,000 men, was here encountered, his army routed, and himself made prisoner. The town is populous, and in general well built; it has a large town-house, where the quarter-sefions and county-courts are held, and members of parliament elected. It has a spacious square, in which a market is held every Saturday. Alnwick appears to have been formerly fortified, by the vestiges of a wall still visible in many parts, and three gates which remain almost entire. It is governed by four chamberlains, who are chosen once in two years out of a common council, consisting of 24 members. It is ornamented by a stately old Gothic castle, which has been the seat of the noble family of Piercy, earls of Northumberland. As the audits for receipt of rents have ever been in this castle, it has always been kept in tolerable repair; and not many years ago, it was repaired and beautified by the duke of Northumberland, who made very considerable alterations, upon a most elegant plan, with a view to reside in it some part of the summer-seaon. The manner of making freemen is peculiar to this place, and indeed is as ridiculous as singular. The persons who are to be made free, or, as the phrase is, leap the well, assemble in the market-place, very early in the morning, on the 25th of April, being St. Mark's day. They appear on horse-back, with every man his sword by his side, dressed in white, and with white night-caps, attended by the four chamberlains and the castle-bailiff, mounted and armed in the same manner; from hence they proceed, with music playing before them, to a large dirty pool, called Free-man's-well, where they dismount, and draw up in a body, at some distance from the water, and then rush into it all at once, and scramble through the mud as fast as they can. As the water is generally very foul, they come out in a dirty condition; but taking a dram, they put on dry clothes, remount their horses, and ride full gallop round the confines of the district; then re-enter the town, sword in hand, and are met by women dressed in ribbons with bells and garlands, dancing and singing. These are called zimmer-wails. The houses of the new freemen are on this day distinguished by a great holly-bush, as a signal for their friends to assemble and make merry with them after their return. This ceremony was owing to king John, who was mired in this well; and who, as a punishment for not mending the road, made this a part of their charter. Alnwick is 310 miles north by west from London, 33 north of Newcastle, and 29 south of Berwick. W. Long. 1. 10. Lat. 55. 24.

ALOA, in Grecian antiquity, a festival kept in honour of Ceres by the husbandmen, and supposed to resemble our harvest-home.

ALOE, in botany, a genus of the monogynia order, belonging to the hexandria class of plants; and, in the natural method, ranking under the 10th order, Coronaria. The character is: There is no calyx: The corolla is monopetalous, erect, six-cleft, and oblong; the tube gibbous; the border spreading, and small; with a nectar-bearing bottom: The stamens consist of six subulate filaments, rather surpassing the corolla in length, and inserted into the receptacles; the anthers are oblong and incumbent: The pistillum has an ovate germen; the stylus is simple, the length of the stigma; the stigma is obus and trifid: The perianthium is an oblong capsule, three-furrowed, three-valved: The seeds are many and angular. Of this genus, botanical writers enumerate nine species; of which the most remarkable are,

1. The difficha, by some called the soap aloe, by others
ALO

**ALO** [484]

**ALO**

Others *calilin aloe*. This seldom rises above two feet high. The leaves are very broad at the base, where they closely embrace the stalk, and gradually decrease to a point. The edges are fret with sharp spines, and the under leaves spread open horizontally every way. These are of a dark green colour spotted with white, somewhat resembling the colour of soft soap, from whence the plant got the name of *soap-aloe*. The flowers grow in umbels on the tops of the stalks, are of a beautiful red colour, and appear in August and September. 1. The variegated, or partridge-breast aloe, is a low plant, seldom rising above eight inches high. The leaves of this are triangular, and curiously veined and spotted, somewhat like the feathers of a partridge's breast. The flowers grow in very loose spikes, and are of a fine red colour tipped with green. 2. The wicofa, with funnel-shaped flowers, grows near a foot high, with triangular leaves of a dark green colour. The flowers grow thinly upon very slender footstalks, are of an herbaceous colour, and their upper part turns backward. 3. The spiralis, with oval rounded flowers, grows somewhat like the former: only the flowers grow upon taller stalks, which branch out and grow in very long close spikes. 4. The linguiformis, or tongue-aloe, has its leaves about six inches in length, and shaped like a tongue. The flowers grow in fezier loose spikes, each hanging downward, of a red colour below, and green at the top. 5. The margaritifera, or pearl aloe, is a very beautiful plant. It is smaller than most of the aloe kind. The leaves are short, very thick, sharp pointed, and turning down, with a large thick end, appear there triangular. The colour of the leaves is a fine green, striped in an elegant manner with white, and frequently tipped with red at the point. The flower-stalk, which rises in the midst of the leaves, is round, smooth, of a purple colour, and generally about eight inches high. When the plant has been properly cultivated, the flowers are striped with green and white; and sometimes they are entirely white. This aloe is singular in not having the bitter rheumy juices with which the leaves of most others abound; when a leaf of this species is cut, what runs from it is watery, colourless, and perfectly insipid. 7. The perforata, or foctorine aloe, hath long, narrow, fuculent leaves, which come out without any order, and form large heads. The stalk grows three or four feet high; and has two, three, and sometimes four, of these heads branching out from it. The flowers grow in long spikes, each hanging on a pretty long footstalk; they are of a bright red colour tipped with green, and generally appear in the winter season. 8. The retina, or cushion aloe, hath very short, thick, succulent leaves, compressed on the upper side like a cushion. This grows very close to the ground; the flowers grow on slender stalks, and are of an herbaceous colour.

**Culture.** The proper earth for planting these vegetables in, is, one half fresh light earth from a common, and the rest an equal mixture of white sea-fand and sifted lime-rubbish. This mixture should be always made fix or eight months before the plants are to be set in. The common aloe will live in a dry green-house in winter; and may be placed in the open air in summer, in a sheltered situation, but must have very little water. Most of the other aloes are best preferred in an airy glass-cage, in which there is a floe, to make a little fire in very bad weather. The tenderest kinds require a greater share of heat to preserve them in winter, and should be kept in a good floe, in a degree of heat ten degrees above temperate. Many other kinds may also be kept in this heat; but the greater the heat, the more water they always require. About the beginning of June, it is usual in England to set the pots of aloes out of the house: but they should be set under the shelter of hedges or trees, to keep them from the violence of the sun; the rains also, which usually fall in this and the following month, are apt to rot them. It is therefore best to keep them under cover the greatest part of the year. The best time to shift these plants is the middle of July. They are, on this occasion, to be taken out of the pots, the loofe earth to be picked from about their roots, and the decayed or mouldy parts of them cut off; then a few stones are to be put at the bottom of the pot, and it is to be filled with the composition already described, and the plants carefully put in, the roots being so disposed as not to interfere with one another. They are to be carefully watered after this, at times, for three weeks, and set in a shady place. The common kind will bear the open air from May till October, and should be shifted every year. All the aloes are propagated by off-sets, or by planting the leaves. The off-sets should be taken from the mother plant, at the time when it is shifted: they are to be planted in very small pots of the proper mixed earth; and if that part of the plants which joined to the mother-plant be observed to be moist when taken off, it should lie on the ground in a shady place two or three days before it is planted, otherwise it will rot. After planting these, they should remain in a shady place a fortnight; and then be removed to a very moderate hot bed, plunging the pots therein, which will help their striking new roots. Towards the end of August they must be, by degrees, hardened to the open air, by taking off the glases of the hot-bed; and in September they may be removed into the green-house.

**Properties, &c.** The aloe is a kind of symbolic plant to the Mahometants, especially in Egypt, and in some measure dedicated to the offices of religion; for whenever retums from a pilgrimage to Mecca, hangs it over his street-door, as a token of his having performed that holy journey. The superstitious Egyptians believe that this plant hinders evil spirits and apparitions from entering the house; and on this account, whoever walks the streets in Cairo, will find it over the doors both of Christians and Jews. From the same plant the Egyptians distil a water, which is sold in the apothecaries shops at Cairo, and recommended in coughs, hysterics, and asthma. An unexperienced French surgeon, says Haffelquift, gave a Coptite, 40 years old, afflicted with the jaundice, four teacups full of the distilled water of this species of *aloe*, and cured him in four days. This remedy, unknown to our apothecaries, is not difficult to be obtained, as the plant might easily be raised in the warm southern parts of Europe. The Arabsians call it *sabara*.

Of the leaves of the Guinea aloe, mentioned by Mr. Adanfon in his voyage to Senegal, the negroes make very good ropes, not apt to rot in the water.

Dr. Sloane mentions two sorts of *aloe*; one of which
is used for fishing-lines, bow-flings, stockings, and hammocks; the other has leaves which, like those of the wild-pine and bananas, hold rain-water, and thereby afford a very necessary refreshment to travellers in hot countries, where there is generally a scarcity of wells and water.

In Mexico, the maguce, a species of aloe, yields almost every thing necessary to the life of the poor. Besides making excellent hedges for their fields, its trunk served in place of beams for the roofs of their houses, and its leaves instead of tiles. From those leaves they obtained paper, thread, needles, clothing shoes, and stockings; and from its copious juice they made wine, honey, sugar, and vinegar. Of the trunk, and thickest part of the leaves, when well baked, they made a very tolerable diath of food. Lastly, it was a very powerful medicine in several disorders, and particularly in those of the urine. It is also at present one of the plants most valued and most profitable to the Spaniards.

The medical substance known by the name of aloe is the infipid juice of some of the aforesaid species. The ancient distinguished two sorts of aloes: the one was pure and of a yellowish colour, inclining to red, resembling the colour of a liver, and thence named hepatic; the other was full of impurities, and hence supposed to be only the dregs of the better kind. At present, various sorts are met with in the shops; which are distinguished either from the places, from the species of the plants, or from some difference in the juices themselves. These may be all ranged in three classes:

1. Aloe Perfoliata, focotrine aloe, brought from the island Soocotora in the Indian ocean, wrapt in skins; it is obtained from the 5th species aforesaid—

2. Aloe Hepatica, hepatic, Barbadoes, or common aloes (the juice of a variety of the former), is not so clear and bright as the foregoing sort; it is also of a darker colour, more compact texture, and for the most part drier. Its smell is much stronger and more disagreeable. Its taste intensely bitter and nauseous, with little or nothing of the fine aromatic flavour of the focotrine.—The best hepatic aloes come from Barbadoes in large gourd-sheals; an inferior sort of it (which is generally soft and clammy) is brought over in casks.

Of the cultivation and preparation of hepatic aloes in the island of Barbadoes, we have the following account in the London Medical Journal. "The lands in the vicinity of the sea, that is, from two to three miles which are rather subject to drought than otherwise, and are so stony and shallow as not to admit of the planting of sugar canes with any prospect of success, are generally found to answer best for the aloe plant. The flowers, at least the larger ones, are first picked up, and either packed in heaps, upon the most shallow barren spots, or laid round the field as a dry wall. The land is then lightly ploughed, and very carefully cleared of all noxious weeds, lined at one foot distance from row to row, like cabbages, at about five or six inches distance from each other. This regular mode of lining and levelling the plants is practiced only by the most exact planters, in order to facilitate the weeding of them, by hand, very frequently; because, if they are not kept perfectly clean and free from weeds, the produce will be but very small. They will bear being planted in any season of the year, even in the driest, as they will live on the surface of the earth many weeks without a drop of rain. The most general time, however, of planting them, is from April to June.

In the March following, the labourers carry a parcel of tubs and jars into the field, and each takes a dip or breadth of it, and begins by laping hold of a bunch of the blades, as much as he can conveniently grasp in one hand, while with the other he cuts it just above the surface of the earth, as quickly as possible (that the juice may not be wasted), and then places the blades in the tub, bunch by bunch, or handful by handful. When the first tub is thus packed quite full, a second is begun (each labourer having two); and by the time the second is filled, all the juice is generally drained out of the blades in the first tub. The blades are then lightly taken out, and thrown over the land by way of manure; and the juice is poured out into a jar. The tub is then filled again with blades, and so alternately till the labourer has produced his jar full, or about four gallons and a half of juice, which is often done in six or seven hours, and he has then the remainder of the day to himself, in being his employer's interest to get each day's operation as quickly done as possible. It may be observed, that although aloes are often cut in nine, ten, or twelve months after being planted, they are not in perfection till the second and third year; and that they will be productive for a length of time, say ten or twelve years, and even for a much longer time, if good dung, or manure of any kind, is fireewed over the field once in three or four years, or oftener if convenient.

The aloe juice will keep for several weeks without injury. It is therefore not boiled till a sufficient quantity is procured to make it an object for the boiling-house. In the large way, three boilers, either of iron or of copper, are placed to one fire, though some have two, and the small planters only one. The boilers are filled with the juice; and, as it ripens or becomes more impalpable, a confant but regular fire, it is ladied forward from boiler to boiler, and the juice is added to that farthest from the fire, till the juice in that nearest to the fire (by much the smallest of the three, and commonly called by the name of tach, as in the manufactury of sugar) becomes of a proper consistence to be skipp'd or lad'd out into gourds, or other small vessels, used for its final reception. The proper time to skipp or ladle it out of the tach, is when it is arrived at what is termed a refin height, or when it cuts freely, or in thin flakes, from the edges of a small wooden slice, that is dipped from time to time into the tach for that purpose. A little lime-water is used by some aloe-boilers, during the process, when the ebullition is too great."
Aloe

As to the sun-dried aloe (which is most approved for medicinal purposes), very little is made in Barbadoes. The process is, however, very simple, though sometimes brought on troublesome symptoms. As it is a flow working purge, it is generally taken at bedtime, and it operates next day.

With regard to this, as well as to all other resistant purges, it ought to be observed, that when they are given in suffrance without any mixture, they are apt to adhere to the coats of the intestines, and to occasion griping and uneasiness; for these reales aloe is generally mixed with some pungent or refreshment body, to destroy its viscid tenacity, before it is given in suffrance. The substances which are most used for this purpose are, a small quantity of the fixed alkaline salts; soap; the yolk of an egg; and gummy vegetable extracts. Mr. Barton alleges, that by triturating aloe with a small quantity of alkaline salts, its tenacity was more effectually destroyed than by any other thing he tried: that Castile soap and the yolk of an egg answered best, next to it: that mann, sugar, and honey, were far inferior to them; and that gummy, or mucous vegetable extracts, such as the extracts of genian, or of liquorice root, triturated with the aloe, in the proportion of one part of the extract to two of the aloe, and then made up into pills with a sufficient quantity of syrup, destroyed the viscidity of the aloe, and rendered its operation more prompt.

Socororine aloe contains more gummy matter than the hepatic; and hence it is like-wise found to purge more and with greater irritation. The first it is more proper where a stimulus is required, as for promoting or exciting the menstrual flux; whilst the latter is better calculated to act as a common purge. For the aloeic preparations, see Pharmacy. Index. Aloe-Wood. See Xyla-Aloe. American Aloe. See Agave.

ALOGIANS, in church-history, a sect of ancient heretics, who denied that Jesus Christ was the Logos, and consequently rejected the gospel of St. John. The word is compounded to the primitive α and λογος, q. d. without Logos or Word. Some ascribe the origin of the name, as well as of the sect of Alogians, to Theodore of Byzantium, by trade a currier; who having apostatized under the persecution of the emperor Severus, to defend himself against those who reproached him therewith, said, that it was not God he denied, but only man. Whence his followers were called in Greek αλογιον, because they rejected the Word. But others, with more probability, suppose the name to have been first given them by Epiphanius in the way of reproach. They made their appearance toward the close of the second century.

ALOGOTROPHIA, among physicians, a term signifying the unequal growth or nourishment of any part of the body, as in the rickets. ALOOF, has frequently been mentioned as a sea-term; but whether justly or not, we shall not presume to determine. It is known in common discourse to imply at a distance; and the resemblance of the phrase keep a look, and keep a look or keep the look, in all probability gave rise to this conjecture. If it was really a sea-phrase originally, it seems to have referred to the dangers of a lee-shore, in which situation the pilot might naturally apply it in the senate commonly understood, viz. keep all off, or quite off: it is, however, never expressed in that...
Alopeca, ALOPECIA (anc. geog.), an island placed by Ptolemy at the mouth of the Tanais, and called the island Tanais; now l'isle des Renards (Baudrand). Also an island of the Bosphorus Cimmerius (Pliny); and another in the Egean sea, over against Smyrna.

ALOPECA, a term used among physicians to denote a total falling off of the hair from certain parts, occasioned either by the defect of nutritious juice, or by its vicious quality corroding the roots of it, and leaving the skin rough and colours.

The word is formed from alouros, τυλίς, “a fox;” whose urine, it is said, will occasion baldness; or because it is a disease which is common to that creature. It is directed to wash the head every night at going to bed with a ley prepared by boiling the ashes of vine branches in common water, is also recommended for the same purpose.

In cafes where the baldness is total, a quantity of the finest burdock roots are to be bruised in a marble mortar, and then boiled in white wine until there remains only as much as will cover them. This liquor, carefully strained off, is said to cure baldness, by washing the head every night with some of it warm. A ley made by boiling ashes of vine branches in common water, is also recommended with this intention. A fresh cut onion, rubbed on the part until it be red and itch, is likewise said to cure baldness.

A multitude of such remedies are everywhere to be found in the works of Valence de Taranta, Rondeletius, Hollerius, Trincavellius, Celsus, Senertay, and other practical physicians. See also BUXUS.

ALOPECURUS, or FOX-TAIL GRASS, in botany: A genus of the triandria digynia class; and in the natural method ranking under the 4th order, Gramina. The characters are: The calyx is single flowered bivalve glume: The corolla is one-valved: The stamina consist of three capillary filaments; the antherae bifurcated at both ends: The stigmate is a roundish germens; there are two styli; and the stigmate is simple: The perigotrum is a corolla cloathing the feeds; and the feed is single and roundish. There are eight species, viz. the pratensis, or meadow fox-tail grass; the bulbous, or bulbous fox-tail grass; the geniculatus, or flore fox-tail grass; and the mycofoideus, or field fox-tail grass; these four grow wild in Britain: the agrestis, the monopellicus, the panicurus, and the hordeiformis, are all natives of France and the southern parts of Europe, except the lath, which is a native of India. See GRASS.

ALOPEX, in zoology, a species of the canis, with a straight tail and black tip. It is commonly called the field fox.

ALOSA, the fad, or mother of harrings, a species of the clupea. See CLUPEA.

ALOST, a town in Flanders, belonging to the house of Austria, seated on the river Dender, in the midway between Brussels and Ghent. It has but one parish; but the church is collegiate, and has a provost, and a dean, and twelve canons. Here is a convent of Carmelites, another of capuchins, another of bare-footed Carmelites, three nunneries, an hospital, and a convent of Guilemins, in which is the tomb of Theodore Martin, who brought the art of printing out of Germany into the Low Countries. He was a friend of Erasmus, who wrote his epigraph. E. Long. 4. 10. N. Lat. 49. 55.

ALPHA, the name of the first letter of the Greek alphabet, anfwering to our A.—As a numeral, it stands for one, or the first of any thing. It is particularly used, among ancient writers, to denote the chief or first man of his class or rank. In this sense, the word stands contradistinguished from beta, which denotes the second person. Plato was called the Alpha of the wits: Eratosthenes, keeper of the Alexandrian library, whom some called a Second Plato, is frequently named Beta. Alpha is also used to denote the beginning of any thing. In which it signifies opposed to omega, which denotes the end. And these two letters were made the symbol of Christianity; and accordingly were engraved on the tombs of the ancient Christians, to distinguish them from those of idolaters. Moralez, a Spanish writer, imagined that this custom only commenced since the rife of Ariana; and that it was peculiar to the orthodox, who hereby made confession of the eternity of Christ: but there are tombs prior to the age of Constantine whereon the two letters were found, besides that the emperor just mentioned bore them on his labarum before Arianism appeared.

ALPHABET, the natural or customary series of the several letters of a language (see LANGUAGE and WRITING). The word is formed from alpha and beta, the first and second letters of the Greek alphabet. The number of letters is different in the alphabets of different languages. The English alphabet contains 24 letters; to which if we add / and v consonant, the sum will be 26: the French contains 23; the Hebrew, Chaldee, Syriack, and Samaritan, 22 each; the Arabic 28; the Persian 31; the Turkish 23; the Georgiack 36; the Coptic 32; the Muscovite 43; the Greek 24; the Latin 22; the Scalvonic 32; the Chaldee, Syriack, and Samaritan languages. The Greek alphabet contains 24 letters; and accordingly were engraved on the tombs of the ancient Christians, to distinguish them from those of idolaters. Moralez, a Spanish writer, imagined that this custom only commenced since the rife of Ariana; and that it was peculiar to the orthodox, who hereby made confession of the eternity of Christ: but there are tombs prior to the age of Constantine whereon the two letters were found, besides that the emperor just mentioned bore them on his labarum before Arianism appeared.

Arguments for writing being a divine revelation.
2. If alphabetical writing were a mere human invention, it might be expected that different nations would have fallen upon the same expedient independent of each other during the compass of so many ages. But no such thing has taken place; and the writing of every people on earth may be referred to one common original. If this can be proved, the argument from successive derivation, without a single instance of independent discovery, must be allowed to amount to the very highest degree of probability in favour of our hypothesis, which will now rest on the evidence for or against this fact; and which may be summed up in the following manner.

Among the European nations we find none who can pretend any right to the discovery of letters. All of them derived the art from the Romans, excepting only the Turks, who had it from the Arabians. The Romans never laid claim to the discovery; but confessed that they derived their knowledge from the Greeks, and the latter owned that they had it from the Phoenicians, who, as well as their colonists the Carthaginians, spoke a dialect of the Hebrewincarefully varying from the original. The Coptic, or Egyptian, resembles the Greek in most of its characters, and is therefore to be referred to the same original. The Chaldee, Syriac, and later Samaritan, are dialects of the Hebrew, without any considerable deviation, or many additional words. The Ethiopic differs more from the Hebrew, but less than the Arabic; yet these languages have all issued from the same stem, so to speak, as the familiarity of their formation, and the number of words common to them, all sufficiently evince; and the Peric is very nearly allied to the Arabic. Alterations indeed would naturally be produced, in proportion to the civilization of the several nations, and their intercourse with others; which will account for the superior copiousness of some above the rest. It appears then, that all the languages in use among men that have been conveyed in alphabetical characters, have been the languages of people connected ultimately or immediately with the Hebrews, who have handed down the earliest specimens of writing to posterity; and we have therefore the greatest reason to believe, that their method of writing, as well as their language, was derived from the same source.

This proposition will be further confirmed from considering the sameness of the artificial denominations of the letters in the Oriental, Greek, and Latin languages, accompanied also by a similar arrangement, as alpha, beta, etc. It may still be objected, however, that the characters employed by the ancients to discriminate their letters are entirely dissimilar. Why should not one nation, it may be urged, adopt from Alphabet, the other the mode of expressing the art as well as the art itself? To what purpose did they take the trouble of inventing other characters? To this objection it may be replied, 1. From the instance of our own language we know what diversities may be introduced in this respect merely by length of time and an intercourse with neighbouring nations. And such an effect would be more likely to take place before the art of printing had contributed to establish a uniformity of character: For when every work was transcribed by the hand, we may easily imagine how many variations would arise from the fancy of the scribe, and the mode of writing so constantly different in individuals. 2. This diversity might sometimes arise from vanity. When an individual of another community had become acquainted with this wonderful art, he might endeavour to recommend himself as the inventor; and to avoid detection, might invent other characters. 3. The characters of the alphabet might sometimes be accommodated as much as possible to the symbology marks already in use amongst a particular people. These having acquired a high degree offacility by the use of many generations, would not be easily superceded without the aid of some such contrivance. 4. This is supported by the testimony of Herodotus; who informs us, that "tho Phoenicians who came introduced many improvements among the Greeks, and alphabetical writing too, not known among them before that period. At first they used the Phoenician character; but in process of time, as the pronunciation altered, the standard of the letters was also changed. The Ionian Greeks inhabited at that time the parts adjacent to Phoenicia; who having received the art of alphabetical writing from the Phoenicians, used it, with an alteration of some few characters, and confessed ingenuously, that it was called Phoenician from the introducers of it." He tells us that he had himself seen the characters of Cadmus in a temple of Hellenic Apollo at Thebes in Boeotia, engraved upon tripods, and very much resembling the Ionian characters. 5. The old Samaritan is precisely the same as the Hebrew language; and the Samaritan Pentateuch does not vary by a single letter in twenty words from the Hebrew: but the characters are widely different: for the Jews adopted the Chaldaic letters during their captivity at Babylon, instead of the characters of their forefathers.

What we know of those nations who have continued for many centuries unconnected with the rest of the world, strongly militates against the hypothesis of the human invention of alphabetical writing. The experiment has been fairly made upon the ingenuity of mankind for a longer period than that which is supposed to have produced alphabetical writing by regular gradations; and this experiment determines peremptorily in their favour. The Chines, a people famous for their discoveries and mechanical art of genius, have made some advances towards the delineation of their ideas by arbitrary signs; but have nevertheless been unable to accomplish this exquisite device; and after so long a trial to no purpose, we may reasonably infer, that their mode of writing, which is growing more intricate and voluminous every day, would never terminate in so clear, so comparatively simple,
Alphabet. Simple, an expediency as that of alphabetical characters.

The Mexicans, too, had made some rude attempts of the same kind; but with less facility than the Chinese.

We know also, that hieroglyphics were in use among the Egyptians prior to the practice of alphabetical writing by the Jews; but whether the epigraph or, as it is called, of the former people, which was in vogue during the continuance of the hieroglyphics, might not possibly be another name for alphabetical writing, cannot be decided.

4. We shall consider the argument on which the commonly received supposition entirely depends: that is, the natural gradation through the several species of symbols acknowledged to have been in use with various people, terminating at last by an easy transition, in the detection of alphabetical characters. The strength of this argument will be best understood from the following representation.

"1. The first method of embodying ideas would be by drawing a representation of the objects themselves. The impracticability of this method is very obvious, both on account of its tedium-nests and its inability of going beyond external appearances to the abstract ideas of the mind.

"2. The next method would be somewhat more general, and would substitute two or three principal circumstances for the whole transactin. So two kings, for example, engaging each other with military weapons, might serve to convey the idea of a war between the two nations. This abbreviated method would be more expeditious than the former; but what it gained in conciseness would be lost in perplexity. It is a description more compendious and indeed, but still a description of outward objects alone, by drawing their resemblance. To this head may be referred the picture-writing of the Mexicans.

"3. The next advance would be to the use of symbols: the incorporation, as it were, of abstract and complex ideas in figures more or less generalized, in proportion to the improvement of it. Thus, in the earlier stages of this device, a circle might serve to express the sun, a semicircle the moon; which is only a contraction of the foregoing method. This symbol-writing in its advanced state would become more refined, but etymological and mystical in proportion to its refinement. Hence it would become less fit for common use, and therefore more particularly appropriated to the mysteries of philosophy and religion. Thus, two feet standing upon water served to express an impossibility, a serpent denoted the oblique trajectories of the heavenly bodies; and the beetle, on account of some supposed properties of that insect, served to represent the sun. The Egyptian hieroglyphics were of this kind.

"4. This method being still too verbose and complicated for common use, the only plan to be pursued was a reduction of the first stage of the preceding method. Thus a dot, instead of a circle, might stand for the sun: and a similar abbreviation might be extended to all the symbols. On this scheme every object and idea would have its appropriated mark: these marks therefore would have a multiplicity proportional to the works of nature and the operations of the mind. This method was likewise practised by the Egyptians; but has been carried to greater perfection by the Chinese. The vocabulary of the latter is therefore infinite, or at least capable of being extended to any imaginable length. But if we compare this tedious and awkward contrivance with the abridging brevity and perfections of alphabetical writings, we must be persuaded that no two things can be more dissimilar; and that the transition from a form constantly enlarging itself, and growing daily more intricate, to the expression of every possible idea by the modified arrangement of four-and-twenty marks, is not so very easy and perceptible as some have imagined. Indeed this seems still to be rather an expression of things in a manner similar to the second stage of symbol-writing than the notification of ideas by arbitrary signs."

To all this we shall subjoin the following remarks, which seem to give additional force to the foregoing reasoning.

"1. Pliny affirms the use of letters to have been eternal, which shows the antiquity of the practice to extend beyond the era of authentic history.

"2. The cabalistical doctors of the Jews maintain, that alphabetical writing was one of the ten things which God created on the evening of the Sabbath.

"3. Most of the profane authors of antiquity ascribe the first use of alphabetical characters to the Egyptians, who, according to some, received them from Mercury; and, according to others, from their god Teth.

"4. There is very little reason to suppose that even language itself is the effect of human ingenuity and invention."

Thus we have stated the arguments in favour of the alphabetical writing; which are answered, by those who take the contrary side, in the following manner.

1. Moses no where says that the alphabet was a new thing in his time; nor does he give the least hint of his being the inventor of it. The first mention we find of writing is in the 17th chapter of Exodus; where Moses is commanded to write in a book; and which took place before the arrival of the Israelites at Sinai. This shows that writing did not commence with the delivery of the two tables of the law, as some have supposed. Neither are we to conclude that the invention had taken place only a short time before; for the writing in a book, is commanded as a thing commonly understood, and with which Moses was well acquainted. It is plain, from the command to engrave the names of the twelve tribes of Israel upon stones like the engravings of a signet, that writing had been known and practised among them, as well as other nations, long before. We must also remember, that the people were commanded to write the law on their door-posts, &c., so that the art seemed not only to have been known, but universally practised among them. But had writing been a new discovery in the time of Moses, he would probably have commemorated it as well as the other inventions of music, &c.; and there is not an argument against that God was the immediate revealer of the art; for Moses would never have omitted to record a circumstance of such importance, as the memory of it would have been one of the strongest barriers against idolatry.
Alphabet.

Again, though several profane writers attribute the origin of letters to the gods, or to some divine person, yet this is no proof of its being actually revealed; but only that the original inventor was unknown. The learned bishop of Gloucester observes, that the ancients gave nothing to the gods of whose origin they had any records, but where the memory of the invention was lost, as of feed-corn, wine, writing, civil society, &c., the gods seized the property, by that kind of right which gives strays to the lord of the manor.

As neither the sacred nor profane historians, therefore, have determined anything concerning the invention of letters, we are at liberty to form what conjectures we think most plausible concerning the origin of them; and this, it is thought, might have taken place in the following manner.

1. Men in their rude uncultivated state, would have neither leisure, inclination, nor inducement, to cultivate the powers of the mind to a degree sufficient for the formation of an alphabet: but when a people arrived at such a pitch of civilization as required them to represent the conceptions of the mind which have no corporeal forms, necessity would occasion further exertions, and urge them to find out a more expeditious manner of transmitting their thoughts than by picture-writing.

2. These exertions would take place whenever a nation began to improve in arts, manufactures, and commerce; and the greater genius such a nation had, the more improvements would be made in the notation of their language; whilst those people who had made less progress in civilization and science, would have a less perfect system of elementary characters; and perhaps advance no farther for many ages than the marks or characters of the Chinese. Hence we may see, that the benefices of princes, as well as the manufacturers and commerce of each country, would produce the necessity of devising some expeditious manner of communicating information to one another.

The art of writing, however, is of so great antiquity, and the early history of most nations is so full of tales, that it must be extremely difficult to determine what nation or people may justly claim the honour of the invention. But as it is probable that letters were the produce of a certain degree of civilization among mankind, we must therefore have recourse to the history of those nations who seem to have been first civilized.

The Egyptians have an undoubted title to a very early civilization; and many learned men have attributed the invention of letters to them. The late bishop of Gloucester contends, that Egypt was the parent of all the learning of Greece, and was referred to by all the Grecian legislators, naturalists, and philosophers; and endeavours to prove that it was one of the first civilized countries on the globe. Their writing was of four kinds: 1. Hieroglyphic; 2. Symbolic; 3. Epistolical; and, 4. Hierogrammatical. In the most early ages they wrote like all other infant nations, by pictures; of which some traces yet remain amongst the hieroglyphics of Horapollo, who informs us, that they represented a fuller by a man's two feet in water; fire, by smoke ascending, &c. But to render this rude invention less inconvenient, they soon devised the method of putting one thing of similar qualities for another.

The former was called the curiologic, the latter the tropical hieroglyphic; which last was a gradual improvement on the former. These alterations in the manner of delineating hieroglyphic figures produced and perfected another character, called the running-hand of the hieroglyphics, resembling the Chinese writing; which having been first formed by the outlines of each figure, became at length a kind of marks; the natural effects of which were, that the constant use of them would take off the attention from the symbol and fix it on the thing signified. Thus the fluid of symbolic writing would be much abbreviated; because the writer or decipherer would then have little to do but to remember the power of the symbolic mark; whereas before, the properties of the thing or animal delineated were to be learned. This, together with the other marks by institution, to denote mental conceptions, would reduce the characters to a similar state with the present Chinese; and these were properly what the ancients called hieroglyphical. We are informed by Dr Robert Huntington, in his account of the Porphyry pillars, that there are some ancient monuments of this kind yet remaining in Egypt.

The sacred book or ritual of the Egyptians, according to Apuleius, was written partly in symbolic and partly in these hieroglyphical characters, in the following manner: "He (the hierophant) drew out certain books from the secret repositories of the sanctuary, written in unknown characters, which contained the words of the sacred formula compendiously expressed, partly by figures of animals, and partly by certain marks or notes intricately knotted, revolving in the manner of a wheel, crowded together, and curled inward like the tendrils of a vine, so as to hide the meaning from the curiosity of the profane."

But though letters were of great antiquity in Egypt, letters not invented in Egypt.

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The sacred book or ritual of the Egyptians, according to Apuleius, was written partly in symbolic and partly in these hieroglyphical characters, in the following manner: "He (the hierophant) drew out certain books from the secret repositories of the sanctuary, written in unknown characters, which contained the words of the sacred formula compendiously expressed, partly by figures of animals, and partly by certain marks or notes intricately knotted, revolving in the manner of a wheel, crowded together, and curled inward like the tendrils of a vine, so as to hide the meaning from the curiosity of the profane."

But though letters were of great antiquity in Egypt, letters not invented in Egypt.
The Greeks, as we have already observed, knew no older Hermes than the second, who lived about 400 years after the Mezric Taaut or Hermes. This second Hermes is called by Plato *Theuth*, and counsellor or sacred scrie to king Thanius; but it is not said that he ever reigned in Egypt: but the former Taaut, or Athothes, as Manetho calls him, was the immediate successor of Menes. The first king of Egypt. His second Mercury, if we may believe Manetho, composed several books of the Egyptian history; and having improved both the language and letters of that nation, the Egyptians attributed the arts and inventions of the former to the latter. The Phoenician language is generally allowed to have been a dialect of the Hebrew; and though their alphabet does not entirely agree with the Samaritan, yet there is a great similarity between them. Astronomy and arithmetic were much cultivated among them in the most early ages: their fine linen, purple, and glafs, were much superior to those of other nations; and their extraordinary skill in architecture and other arts was such, that whatever was great, elegant, or pleasing, whether in buildings, apparel, or toys, was distinguished by the epithet of Tyrian or Sidonian; these being the chief cities of Phoenicia. Their great proficiency in learning and arts of all kinds, together with their engrossing all the commerce of the western world, are likewise thought to give them a just claim to the invention of letters.

The Chaldeans also have laid claim to the invention of the letters; and with regard to this, there is a tradition Chaldean, among the Jews, Indians, and Arabsians, that the Egyptians derived their knowledge from Abraham, who was a Chaldean. This tradition is in some degree confirmed by most of the western writers, who ascribe the inventions of arithmetic and astronomy to the Chaldeans. Josephus positively affirms, that the Egyptians were ignorant of the sciences of arithmetic and astronomy before they were instructed by Abraham; and Sir Isaac Newton admits, that letters were known in the line of that patriarch for many centuries before Moses. The Chaldaic letters appear to have been derived from the Hebrew or Samaritan; which are the same, or nearly so, with the old Phoenician. Ezra is supposed to have exchanged the old Hebrew characters for the more beautiful and commodious Chaldee, which are still in use. Berosus, the most ancient Chaldean historian, who was born in the minority of Alexander the Great, does not say that he believed his countrymen to have been the inventors of letters.

The Syrians have also laid claim to the invention of the Syriac letters. It is certain, indeed, that they yielded to the Syrians no nation in knowledge and skill in the fine arts. Their language is said to have been the vernacular of all the Oriental tongues, and was divided into three dialects. 1. The Aramean, used in Mesopotamia, and by the inhabitants of Roza and Edesa of Harram, and the Outer Syria. 2. The dialect of Palestine, spoken by the inhabitants of Damascus, Mount Libanus, and the Inner Syria. 3. The Chaldee or Nabathean dialect, the most unpolished of the three; and spoken in the mountainous parts of Alaysia, and the villages of

(A) See above, n° 2. where he says that the knowledge of letters was eternal. What dependence can we put in the testimony of such a writer?
words; the fundamental part being being divided into three classes, viz. 1. Dhaut or roots of verbs; 2. Shabd, or original nouns; 3. Eya, or particles. Their alphabet contains 50 letters; viz. 34 consonants and 16 vowels. They assert that they were in possession of letters before any other nation in the world; and Mr Halhed conjectures, that the long-boated original civilization of the Egyptians may still be a matter of dispute. The Rajah of Kishangur affirms, that he has in his possession Shanferit books, where the Egyptians are constantly described as disciples, not as instructors; and as seeking in Hindooslan that liberal education, and those sciences, which none of their own countrymen had sufficient knowledge to impart. Mr Halhed hints also, that the learning of Hindooslan might have been transplanted into Egypt, and thus have become familiar to Mofes. Several authors, however, are of opinion, that the ancient Egyptians possessed themselves of the trade of the East by the Red Sea, and that they carried on a considerable traffic with the Indian nations before the time of Sesostris; whom they suppose to have been contemporaneous with Rehoboam, though Sir Isaac Newton conjectures him to have been the child of Jedidiah who took Jerusalem in the time of Rehoboam.

In the year 1769, one of the sacred books of the Gentoo called Bagaaudam, translated by Meridas Poole, a learned man of Indian origin, and chief interpreter to the supreme council of Pondicherry, was sent by him to M. Bertin in France. In his preface he says, that it was composed by Visifer the son of Brahma, and is of sacred authority among the worshipers of Vishnou. This book claims an antiquity of 5000 years; but M. de Guines has shown, that its pretensions to such extravagant antiquity are entirely inconclusive and unsatisfactory; whence we may conclude, says Mr Adle, that though a farther inquiry into the literature of the Indian nations may be desirable, yet we must by no means give too easy credit to their relations concerning the high antiquity of their manuscripts and early civilization.

It is not pretended that the Persians had any great Letters not learning among them till the time of Herilages the invented in father of Darius. The former, we are told, travelled into India, and was instructed by the Brahins in the sciences for which they were famed at that time. The ancient Persians defied riches and commerce, nor had they any money among them till after the conquest of Lydia. It appears by several inscriptions taken from the ruins of the palace of Persepolis, which was built near 700 years before the Christian era, that the Persians sometimes wrote in perpendicular columns like the Chinees. This mode of writing was first made use of on the stems of trees, pillars, or obelisks. As for those simple characters found on the west side of the Baur-cafe of Persepolis, some have supposed them to be alphabetic, some hieroglyphic, and others antediluvian. Dr Hyde pronounces them to have been mere whimsical ornaments, though the author of Conjectural Observations on Alphabetic Writing supposes them to be fragments of Egyptian antiquity brought by Cambyses from the spoils of Thesbes. The learned are generally agreed, that the Persians were later in civilization than many of their neighbours; and they are not supposed to have any pretensions to the invention of letters.

As the Arabian have been in possession of the coun-
The parents of letters. This circumstance greatly favours their claim to the invention; because Chaldea, and the countries adjacent, are allowed by all authors both sacred and profane, to have been peopled before Egypt; and it is certain that many nations said to be descended from Shem and Japheth, had their letters from the Phenicians, who were descended from Ham.

"It is observable, that the Chaldeans, the Syrians, Phenicians and Egyptians, all bordered upon each other; and as the Phenicians, were the greatest in the most ancient commercial nation, it is very probable that they communicated letters to the Egyptians, the ports of Tyre and Sidon being not far distant from each other.

"Mr Jackson is evidently mistaken when he says, that letters were invented 2190 years before the birth of Christ. The deluge recorded by Moses was 2249 years before that event; and if letters were not invented till 550 years after, as he affirms, we must date their discovery only 1799 years before the Christian era, which is 410 years after the reign of Menes the first king of Egypt, who, according to Syncellus and others, is said to have been the same person with the Mifor of Sanchoniatho, the Mizraim of the Scriptures and the Oliris of the Egyptians; but whether this be true or not, Egypt is frequently called in Scripture the land of Mizraim.

"This Mizraim, the second son of Amyn or Ham seated himself near the entrance of Egypt at Zoan, in the year before Christ 2188, and 160 years after the flood. He afterwards built Thebes, and some say, Memphis. Before the time that he went into Egypt, his son Taant had invented letters in Phenicia; and if this invention took place ten years before the migration of his father into Egypt, as Mr Jackson supposes, we may trace letters as far back as the year 2172 before Christ, or 550 years after the deluge recorded by Moses; and beyond this period, the written annals of mankind, which have been hitherto transmitted to us, will not enable us to trace the knowledge of them; though this want of materials is no proof that letters were not known until a century and an half after the deluge. As for the pretensions of the Indian nations we must be better acquainted with their records before we can admit of their claim to the first use of letters; especially as none of their manuscripts of any great antiquity have as yet appeared in Europe. That the Arabian nations were not the inventors of letters, has appeared by their own confession.—Plato somewhere mentions Hyperborean letters very different from the Greek; and these may have been the characters used by the Tartars or ancient Scythians.

"It may be expected that something should be said concerning those books mentioned by some authors to have been written before the deluge. Amongst others, Dr Parsons, in his Remains of Japhet, p. 346, 350, supposes letters to have been known to Adam; and the Sabaeans produce a book which they pretend was written by Adam. But concerning these we have no guide to direct us any more than concerning the supposed books of Enoch; some of which, Origen tells us, were found in Arabia Felix, in the dominion of the queen of Sheba. Tertullian affirms, that he saw and
Mr. Affle next proceeds to consider what alphabets are derived from the Phoenician. These he proposes to have been immediately the ancient Hebrew or Samaritan; the Chaldaic; the Baftilian (A) or Spanish Phcenicium; the Punic, Carthaginian, or Sicilian; and the Pelagian. From the ancient Hebrew proceeded the Chaldaic or square Hebrew; the round Hebrew; and what is called the running hand of the Rabbins. The Pelagian gave birth to the Etruca, Eugubian, or Umbrian, Ofcan, Samnite, and Ionic Greek, written from the left. From the Chaldaic or square Hebrew are derived the Syrian, and the ancient and modern Arabic. The Syrian is divided into the Esrangelo and Mendezan, and the modern Arabic has given rise to the Persian and Turki. From the ancient Arabic are derived the Kufic or Oriental, the Mauritanic or Occidental; the African or Saracen, and the Moorish. The Ionic Greek gave rise to the Arcadian, Latin, ancient Gaulish, ancient Spanish, ancient Gothic, Coptic, Ethiopick, Russian, Illyrian or Slavonic, Bulgarian and Armenian. From the Roman are derived the Lombardic, Visigothic, Saxoum, Gallican, Franko-Galic or Merovingian, German, Caroline, Capetian, and modern Gothic.

The Punic letters are also called Tyrian, and were much the same with the Carthaginian or Sicilian. The Punic language was at first the same with the Phoenician; it is nearly allied to the Hebrew, and has an affinity with the Chaldeese and Syriac. Some remains of it are to be met with in the Maltefe. To make a complete Punic, Carthaginian, or Sicilian alphabet, we must admit several pure Phoenician letters.

The Pelaѓi were likewise of Phoenician original; and, according to Sanconiotho, the Dioscuri and Cabiri wrote the first annals of the Phoenician history, by order of Taut the inventor of letters. They made ships of barchen, and being cast upon the coast near mount Caicus, about 40 miles from Pelusium, where they built a temple in the second generation after the deluge related by Moses, they were called Pelaѓi from their paling by fire, and wandering from one country to another. Herodotus informs us, that the Pelagi were descendants of the Phcenian Cabiri, and that the Samothracians, received and practised the Cabiric mysteries from them. The Pelagic alphabet prevailed in Greece till the time of Deucalion, when the Pelagi were driven out of Thessaly or Oenotria by the Hellenes; after which some of them settled at the mouth of the Po, and others at Croton, now Cartona in Tuscany. Their alphabet consisted of 16 letters, and the Tyrrenian alphabet, brought into Italy before the reign of that prince, consisted of no more than 13. Deucalion is said to have reigned about 820 years after the deluge, and 1520 before the Christian era.

That the Turrhini, Tysfeni, or Hetrufci, resettled in Italy long before this period, appears from the testimony of Herodotus, who informs us, that a colony went by sea from Lydia into Italy under Turrhenus; and Dionysius of Halicarnassus proves that many authors called them Pelagi. He then cites Hellanicus Lelbicus, an author somewhat more ancient than Herodotus,

(A) The Baftuli are said to have been a Canaanitish or Phcenician people who fled from Joshua, and settled afterwards in Spain.
The Etruscan letters are Pelasgic, and several of the Etruscan inscriptions are written in the Pelasgic language. The Roman letters are Ionic. The Oscan language was a dialect of the Etruscan; their characters are nearer the Ionic or Roman than the Etruscan. There is also very little difference between the Etruscan, Oscan, and most ancient Greek letters, which are placed from right to left. The Arcadians were ancient Greeks, and used the Ionic letters, but at what time they began to write from left to right is not known, as their chronology is very uncertain. The Etruscan, Oscan, and Samnite alphabets are derived from the Pelasgic; they differ from each other more in name than in form, but a far greater number are derived from the Ionic Greek; namely, the Arcadian, the Latin or Roman, and the others already enumerated. The Runic is immediately derived from the Gothic.

According to Dionysius of Halicarnassus, the first Greek colony which came into Italy consisted of Arcadians under the conduct of Oenorbus the son of Lycaon, and fifth in descent from Phoroneus the first king of Argos, who reigned about 566 years before the taking of Troy, and 1730 years before the Christian era. These Arcadians were called Aborigines; and after they had been engaged for many years in a war with the Siculi, entered into an alliance with a colony of the Pelasgii, who came out of Thessaly into Italy, after having been driven from the Ionian country. — About 1476 B.C. another colony of the Pelasgii, who had been driven out of Thessaly by the Curetes and Leleges, arrived in Italy, where they allied themselves with the Aborigines to drive out the Siculi, poising themselves on the highest part of the country between the Tiber and the Liris, and building several cities. Solinus and Pliny tell us, that the Pelasgii first carried letters into Italy; and the latter distinguishing between the Pelasgii and the Arcades: so the letters first carried into Italy were not the Ionic Greek, but those more ancient Pelasgic characters which the Pelasgii carried with them before Dencalius and Cadmus are said to have come into Etruria and Thessaly. The story of Cadmus is much involved in fable; but it is agreed by most of the ancients, that the children of Agenor, viz., Cadmus, Europa, Phoenix, and Cilix, carried with them a colony composed of Phoenicians and Syrians, into Aea Minor, Crete, Greece, and Libya, where they introduced letters, music, poetry, and other arts, sciences, and customs of the Phoenicians. Dionysius enumerates the following Greek colonies which came into Italy: 1. The Aborigines under Oenorbus from Arcadia. 2. The Pelasgic colony which came from Hecatomia or Thessaly. 3. Another Arcadian colony which came with Evander from Pallantium. 4. Those who came from Peloponneseas with Hercules; and, 5. Those who came with Atreus from Troy. It is not easy to discover when the Ionic way of writing from left to right was introduced into Italy; but it is certain, that it did not universally prevail even in Greece till several ages after it was found out. The Athenians did not comply with it till the year of Rome 350; nor was it practiced by the Samnites even in the sixth century of that city, or 230 years before Christ: for M. Cæcilin, Vol. VI. pl. 2, gives us the Samnite alphabet of that century, wherein the letters are placed from right to left, although the Ionic way of writing prevailed in some parts of Italy in the third century of Rome. "In time (says Pliny), the same content of all nations agreed to use the Ionic letters. The Romans consented to this mode about the time of Tarquiniius Priscus their fifth king." The letters brought by Damareus left Asia Minor and Crete, the father of Evander, Mr. Whittaker thinks, must have been the new or Ionic alphabet, and not the same with that brought by Evander 300 years before. After the Romans had established the use of the Ionic letters, they seem not to have acknowledged the Pelasgian and Etruscan to have been Greek alphabets; the most learned of them knew none older than the Ionic, as appears from the Greek Farneuse inscriptions of Herodes Atticus. This learned man, out of a regard to antiquity, cau­fed the oldest orthography to be observed in the writing, and the letters to be delineated after the most antique forms that could be found; and they are plainly no other than the Ionic or right-handed characters.

The ancient Gaulish letters are derived from the Greek, and their writing approaches more nearly to the Gothic than that of the Romans; this appears from the following Latin inscriptions of Gordian, messengers of the Gauls, who suffered martyrdom in the third century with all his family. These ancient Gaullish characters were generally used by that people before the conquest of Gaul by Caesar; but after that time the Roman letters were gradually introduced. The ancient Spaniards used letters nearly Greek before their intercourse with the Romans. The ancient Gothic alphabet was very similar to the Greek, and is attributed to Ulphilas, bishop of the Goths, who lived in Maslia about 370 years after Christ. He translated the Bible into the Gothic tongue. This circumstance might have occasioned the tradition of his having invented these letters; but it is probable that these characters were in use long before this time. The Runic alphabet is derived from the ancient Gothic.

The Coptic letters are derived immediately from the Greek. Some have confounded them with the ancient Egyptian; but there is a very material difference between them. The Ethiopic alphabet is derived from the Coptic.

The alphabet proceeding from that of the Scythians established in Europe, is the same with that St. Cyril calls the Servian. The Russian, Hungarian or Slavonic, and the Bulgarian, are all derived from this alphabet. The Armenian letters differ very much from the Greek, from which they are derived, as well as from the Latin.

With regard to the alphabets derived from the Latin, the Lombardic relates to the manuscripts of Italy; the
Alphabet. The Visigothic to those of Spain; the Saxon to those of England; the Gallican and Franco-Gallic or Merovingian to those of that country; and the Caroline Capetian, and Modern Gothic, to all the countries of Europe who read Latin. The first six of these alphabets are before the age of Charlemagne, the last three posterior to it. They are more distinguished by their names than the forms of their characters, and the former indicate all to have been of Roman extraction. Each nation, in adopting the letters of the Romans, added thereto a style and manner peculiar to itself, which obviously distinguished it from the writings of all other people; whence arose the differences between the writings of the Lombards, Spaniards, French, Saxons, Germans, and Goths, and all the strange terms observable in the writings of the Francs Gauls or Merovingians; and those of the Carolingians their successors may be traced from the same source. From these distinctions the name of national writing was derived.

The writing of Italy was uniform till the irruption of the Goths, who disfigured it by their barbarous taste. In 569, the Lombards, having possessed themselves of all Italy, excepting Rome and Ravenna, introduced that form of writing which goes under their name; and as the Popes used the Lombardic manner in their bulls, the name of Roman was sometimes given to it in the 11th century; and though the dominion of the Lombards continued no longer than 200 years, the name of their writing continued in Italy from the 7th to the 13th century, and then ceased: when learning, having declined in that as well as in other countries, the manner of writing degenerated into the modern Gothic.

The Visigoths introduced their form of writing into Spain, after having overrun that country; but it was abolished in a provincial synod held at Leon in 1091, when the Latin characters were established for all public instruments, though the Visigothic were used in private writings for three centuries afterwards.

The Gauls, on being subjected by the Romans, adopted the manner of writing, but by subsequent additions of their own, their characters were changed into what is called the Gallican or Roman Gallic mode. This was changed by the Franks into the Franco-Gallic or Merovingian mode of writing, being practised under the kings of the Merovingian race. It took place towards the close of the sixth century, and continued till the beginning of the ninth.

The German mode of writing was improved by Charlemagne, and this improvement occasioned another distinction in writing by introducing the alphabet named Caroline, which declined in the 12th century, and was succeeded in the 13th by the modern Gothic. In France it had degenerated by the middle of the 10th century, but was restored in 987 by Hugh Capet, whence it obtained the name of Capetian. It was used in England as well as Germany and France.

The modern Gothic, which spread itself all over Europe in the 12th and 13th centuries, is improperly named, as not deriving its origin from the writing anciently used by the Goths. It is, however, the worst and most barbarous way of writing, and originated among the schoolmen in the decline of the arts; being indeed nothing else than Latin writing degenerated.

It began in the 12th century, and was in general use, especially among monks and theologians, in all parts of Europe, till the restoration of arts in the 14th century, and continued longer in Germany and the northern nations. The late books are still printed in Gothic letters. The most barbarous writing of the seventh, eighth, and ninth centuries, was preferable to the modern Gothic. It is diversified in such a manner as can scarcely admit of description; and the abbreviations used by the writers were so numerous, that it became very difficult to read it; which was one of the great causes of the ignorance of those times. Along with this, however, the Lombardic, Gothic, Roman, Caroline, and Capetian modes of writing, were occasionally used by individuals.

The idea that all the alphabets abovementioned are derived from the Roman, tends to prove the distinctness of national writing, and is of great use in discovering the age of manuscripts: for though we may not be able exactly to determine the time when a manuscript was written, we may be able nearly to ascertain its age. For example, if a writing is Merovingian, it may be declared not to be posterior to the ninth, nor prior to the fifth century. If another be Lombardic, it may be affirmed to be posterior to the middle of the sixth, and prior to the 13th. Should it be Saxon, it cannot be of an earlier date than the 7th, nor later than about the middle of the 12th.

Having considered whence the alphabets now in use throughout the various nations of the world are derived, it remains to say something concerning them as the elements of words, or how far they are capable of expressing those sounds, which, by proper combination and arrangement, constitute articulate language. The number of simple sounds in any language cannot be very numerous; and it is plainly these simple sounds alone that we have occasion to represent by alphabetical characters. Hence the person who first invented letters, must have been capable of analysing language in a manner which seems by no means easy to do, and concerning which even the learned among ourselves are not yet agreed. It is this difficulty which has produced the great diversity in the number of alphabetical characters used by different nations; and where we see a vast number of them used, we may account the writing not the better, but much the worse for it; and whoever the pretended inventor was, it is more reasonable to suppose that he disfigured an alphabet already invented, by unnecessary additions, than been the author of one himself.

When we consider alphabetical characters as thus probably resulting from an analysis of language, it will by no means appear probable that it was derived from a gradual and progressive operation of the human mind through many ages. There is not the least affinity between representing any object by a picture and finding out the sounds which compose the word by which it is expressed; nor, indeed, though a nation had been in use to represent things either in this method, or by any kind of arbitrary marks, for thousands of years, could the one ever have led to the other. Arbitrary marks must always be the same with pictures in this respect, that they must always be fixed to particular objects, and thus increased ad infinitum. Letters, on the other hand, are indifferent to all
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**Plate A1**

*a dexta ad sinistram erat*  
*a sinistra ad dextram*
### ALPHABETAE ANTIQUAE

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**Plate VII**
...other things strongly inspired, ventured, nature. This might furnish an argument for the faculty of articulate sounds, which mankind have invented, we know how; so that if one inclined to suppose this a turn of thought in a divine revelation, he could be at little loss for arguments to support his hypothesis. This was what all the inventions and evolutions of human powers since the creation had never been able to accomplish; yet nobody believes that it required supernatural abilities to be the author of this art, because we see plainly that it might have occurred to the human mind from various sources, and are surprised that it did not occur long before. In like manner, the method of accounting for the celestial motions by the united forces of projection and gravitation, was no refult of the progress that mankind had made in science, but luckily occurred to Mr Horrox, without any thing that we know to direct him, or perhaps from causes almost unknown to himself. Thus also, the steam-engine, aca-40

dimation of a separate mark or letter to represent each articu-}
Mr. Sheridan observes, that our alphabet is ill calculated for the notation of the English tongue, as there are many sounds for which we have no letters or marks, and ought to be nine more characters or letters to make a complete alphabet, in which every simple sound ought to have a mark peculiar to itself. The reason of the deficiency is, that the Roman alphabet was formerly adopted for the notation of the English language, though by no means fitted to the purpose.

It now remains only to take some notice of the forms of the different letters; some knowledge of which is absolutely necessary, for after attending the age and authenticity of inscriptions, manuscripts, charters, and ancient records. Many authors are of opinion that letters derive their forms from the positions of the organs of speech in their pronunciation. Van Helmont has taken great pains to prove, that the Chaldaic characters are the genuine alphabet of Nature; because, according to him, no letter can be rightly founded without disjoining the organs of speech into an uniform position with the figure of each letter; and in support of this system, he has ascertained the organs of articulation.

Mr. Helmont endeavored to show, that all elementary characters, or letters, derive their forms from the line and the circle. His alphabet consists of 13 radical letters, four diminished, and four augmented. The radicals are D, O, S, A, B, C, D, N, U, J, E, M, F. H, according to him, is derived from A; P from U; T from D; and F from U: these are all called diminished letters. The augmented ones are Z from S; G from C; W from U; and Y from I. He proves that his characters are very similar to those of the ancient Etruscans: but all characters are composed either of lines and circles of the former, and of parts of the latter. Mr. Gelbin deduces them from hieroglyphic representations, and has given several delineations of human figures, trees, &c. in confirmation of this hypothesis.

One of the most simple alphabets has been formed, by making two perpendicular and two horizontal lines: a b c d e f g h i j k l; from which may be deduced nine different characters or letters; thus:

Nine more may be made by adding a point to each, Alphanis,

and as many more as n o p may be sufficient q r s t u v w x y z for the notation of any language, by adding two or more points to each character. Though these square characters are not calculated for dispatch; yet they may be made as expeditiously, or more so, than the Tartar, the Bramin, the Cachmirian, or many others. Writing composed of these characters, is at first sight somewhat like the Hebrew. — Mr. Dow, author of the History of New Indo-Indian, lately formed a new language and alphabet, invented by

ALPHENIX, white barley-fugar, to which is given an extraordinary name, to render it more valuable. This fugar, which is thought good for colds, is made of common fugar, which is boiled until it becomes easy to crack, when they pour it upon a marble table, greased with oil of sweet almonds, and mould it into various figures with a brais crotchet. It is easily fattened with flour.

ALPHERY (Mikipher), born in Russia, and of the Imperial line. When that country was torn to pieces by intestine quarrels, in the latter end of the 16th century, and the royal house particularly was so severely persecuted by impostors, this gentleman and his two brothers were sent over to England, and recommended to the care of Mr. Joseph Bidell, a Ruffian merchant. Mr. Bidell, when they were of age fit for the universality, sent them to Oxford, where the small-pox unhappily prevailing, two of them died of it. We know not whether this surviving brother took degrees or not, but it is very probable he did, since he entered into holy orders; and in the year 1618, had the rectory of Woolley in Huntingdonshire, a living of no very considerable value, being rated at under £10 in the king’s books. Here he did his duty with great cheerfulness and alacrity; and although he was twice invited back to his native country by some who would have ventured their utmost to have set him on the throne of his ancestors, he chose rather to remain with his flock, and to serve God in the humble station of a parson’s cot. Yet in 1643, he underwent the severest trials from the rage of the fanatics; who, not satisfied with depriving him of his living, insulted him in the most barbarous manner, for having procured a file of musqueteers to pull him out of his pulpit, as he was preaching on a Sunday, they turned his wife and small children into the street, into which also they threw his goods. The poor man in this distress raised a tent under some trees in the church-yard, over against his house, where he and his family lived for a week. One day having gotten a few eggs, he picked up some rotten wood and dry sticks, and with these made a fire in the church-porch in order to boil them; but some of his adversaries, to show how far they could carry their rage against the church, for this poor man was so harmless they could have none against him, came and kicked about his fire, threw down his skillet, and broke his eggs. After this, having still a little money, he made a small purchase in the neighbourhood, built
him a house, and lived there some years. He was encouraged to this by a Prelatyman minister who came in his room, who honestly paid him the fifth part of the annual income of the living, which was the allowance made by parliament to ejected ministers, treated him with great humanity, and did him all the services in his power. It is a great misfortune that this gentleman's name is not preserved, his conduct in this respect being the more laudable, because it was not a little singular. Afterwards, probably on the territory of Megalopolis, he returned to the town of Arcadia, and by Olympia in Elis, with a fourth part of the proceeds paid him in possession of his living again. He returned on this occasion to Huntingdonshire, where he did not stay long; for being upwards of 80, and withal very infirm, he could not perform the duties of his function. Having, therefore, letted a curate, he retired to his eldest son's house at Hammermith, where shortly after he died, full of years and of honour.

The Alpheus, (Strabo, H. P., (Polyemus); a noted and large river of the Eleonnesos; which, rising in, and after several windings running through, Arcadia, and by Olympia in Elis, with a south-west course, pours into the Sinus Arcadion, about ten miles to the south of Olympia. It has a common spring with the Eurotas, at the foot of mount Parthenius, near the village Arece, (Strabo.) The Alpheus and Eurotas mix and run together for 20 stadia; after which, they enter a subterraneous passage at Mantinea; then again emerge, the Eurotas at Lacocina, and the Alpheus in the territory of Megalopolis. (Pausanias.) The poetics stange things of this river; particularly, that, out of love to the nymph Arethusa, it runs under the sea to Sicily, and bursts out at the fountain of that name in Syracuse, (Virgil.) Its waters are reckoned good in the leprosy, which is called Aegis by the Greeks; and hence the name Alpheus.—Pausanias adds, that the Eleans had a law, which condemned any woman to death that should either appear at the Olympic games, or even cross this river during that solemnity: and the Eleans add, that the only woman who transgressed it, had disguised herself in the habit of a woman, and conducted her son thither; but when the law came off victorious, her joy made her forget her disguise, so that her sex was discovered. She was pardoned, but from that time a law was made that the keepers should appear there naked.

ALPHONSIN, in surgery, an instrument for extracting bullets out of gun-shot wounds. This instrument derives its name from the inventor Alphonse Ferrer, a physician of Naples. It consists of three branches, which are closed by a ring. When closed and introduced into the wound, the operator draws back the ring towards the handle, upon which the branches opening take hold of the ball; and then the ring is pushed out of the haft, by which means the branches grasp the ball so firmly, as to extract it from the wound.

ALPHONSOX. King of Leon and Castile, surnamed the Wise, was author of the astronomical tables called Alphonsias. Reading of Quintus Curtius gave him such delight, that he recovered him out of a dangerous illness. He read the Bible fourteen times, with several comments on it. He is said to have found fault with the structure of the mundane system, and has been charged with impiety on that score; but unjustly, for he only found fault with the involved system of some astronomers. He was detoined by his son Sancho; and died of grief, A. D. 1284.

ALPINI (Propero), a famous physician and botanist, born in the Venetian territory, 1553. He travelled in Egypt to acquire a knowledge of exotic plants, and was the first who explained the fertilization and generation of plants by the sexual fluid. Upon his return to Venice, in 1589, Andrea Doria, prince of Melfi, appointed him his physician: and he distinguished himself so much in this capacity, that he was esteemed the first physician of his age. The republic of Venice began to be uneasy, that a subject of theirs, of so great merit as Alpini, should continue at Genoa, when he might be of so much service and honour to their state: they therefore recalled him in 1593, to fill the professorship of botany at Padua: and he had a salary of 200 florins, which was afterwards raised to 750. He was discharged this office with great reputation; but his health became very precarious, and he had been much broken by the voyages he had made. According to the register of the university of Padua, he died the 5th of April 1617, in the 64th year of his age; and was buried the day after, without any funeral pomp, in the church of St Anthony. Alpini wrote the following works in Latin: 1. Of the physic of the Egyptians, in four books. Printed at Venice, 1591, in 4to. 2. A treatise concerning the plants of Egypt. Printed at Venice, 1592, in 4to. 3. A dialogue concerning balsams. Printed at Venice, 1592, in 4to. 4. Seven books concerning the method of forming a judgment of the life or death of patients. Printed at Venice, 1691, in 4to. 5. Thirteen Books concerning methodical Physic. Padua, 1611; folio; Leyden, 1719, in 4to. 6. A Disputation held in the school at Padua, concerning the Raphonticum. Padua, 1612, and 1624, 4to. 7. Of exotic plants, in two books. Venice, 1699, in 4to. He left several other works, which have never been printed; particularly, 8. The fifth book concerning the physic of the Egyptians. 9. Five books concerning the natural history of things observed in Egypt, adorned with a variety of draughts of plants, flowers, and animals.

ALPINIA, in botany: A genus of the monandria order, belonging to the monandria class of plants; and in the natural method ranking under the 8th order, Scitamineae. The characters are: The calyx is a perianthium above, small, and trifid: The corolla is monopetalous, unequal, and as if doubled: The flaminea consist of one filament, with linear anticlvea, joining to the margin: The pistillum has a roundish stalk, beneath; the stylus simple, and the stigma obtusely trigonous: The pericarpium is a finely ovate trilocular capsule, with three valves: The seeds are ovate, and very numerous; the receptaculum is pulpy and very large. Of this genus there is but one species which is a native of the West Indies, where it grows naturally in moist places. The leaves decay every winter, and are pulled off from the roots in the spring, like the ginger and maranta; fo must be managed in the same manner as directed for these two plants, and may be propagated by parting the roots when the leaves decay.
The prospect from many parts of this enormous range of mountains is extremely romantic, especially towards the north-west. One of the most celebrated is the Grande Chartreuse, where is a monastery founded by St Bruno about the year 1084. From Chartreux, a little village in the mountains of Savoy, to the top of the Chartreuse, the distance is five miles. Along this course the road runs winding up, for the most part not fixed feet broad. On one hand is the rock, with woods of pine trees hanging over head; on the other a prodigious precipice almost perpendicular; at the bottom of which rolls a torrent; that, sometimes tumbling among the fragments of stone which have fallen from on high, and sometimes precipitating itself down vast declivities with a noise like thunder, rendered yet more tremendous by the echo from the mountains on each side, consorts to form one of the most solemn, the most romantic, and most astonishing scenes in nature.

To this description may be added the strange views made by the crags and cliffs, and the numerous cascades which throw themselves from the very summit down into the vale. On the top of the mountain is the convent of St Bruno, which is the superior of the whole order. The inhabitants consist of 100 fathers, with 200 servants, who grind their corn, press their wine, and perform every domestic office, even to the making of their clothes. In the Album of the fathers is admired an alea odes, written by the late ingenious Mr. Gray when he visited the Chartreuse, and which has since been published among his works.

The glaciers of Savoy are also justly reckoned among the most stupendous works of nature. These are immense masses of ice, lodged upon the gentler declivities amidst the Alps, and exhibiting representations beyond conception fantastic and picturesque. In the extraordinary narrative of Mr. Bourri's journey thither, we meet with the following account of the Pierre, in the valley of Champillon. We had, says he, the magnificent prospect of a chain of mountains, equally inaccessible, and covered with ice; and above the rest that of Mount Blanc, whose top seemed to reach, and even pierce, the highest region of the clouds. The chain upon which this mountain looks down like a giant, is composed of masses of rocks, which terminate in pikes or spires, called the Needles, and which are ranged like tus in a camp. Their sides appear lighter and more airy, from the ornament of several hollow breaks and furrows fretted in the rock itself, as well as from the different streaks and lanes of ice and snow, which, without changing the general character of their form, or the majesty of their appearance, give them a picturesque variety. Lower down, the eye survey's with ravishment the hills of ice, and the several glaciers, extending almost into the plain, whilst this appears like an artificial garden, embellished with the mixture of a variety of colours. We have a picturesque opposition to this chain, which is formed by innumerable mountains at the distance of near 50 leagues, between whose tops we have a glimpse of those several plains which they environ. M. de Sainthubert, who had visited those mountains about two months before M. Bourri, felt himself naturally electrified in this place. This extraordinary phenomenon seems not to have been experienced by the latter or his company; but they heard a long-conceived
Alps. tinued rumbling noise, like that of thunder, which was rendered more awful by the silence of the place where they stood. This noise proceeded from the subsequent causes, viz. the avalanches of snow, which separated from the tops of the mountain, and rolled down to the bottom; considerable fragments of the rocks which followed them, overturning others in their fall; and many blocks of ice, which precipitated from the summits.

The valley of Montanvert appears to be peculiarly romantic. Here, says M. Borrut, we beheld a spacious icy plain entirely level. Upon this there reigned a mountain all of ice, with steps ascending to the top, which seemed the throne of some divinity. It likewise took the form of a grand cascade, whose figure was beyond conception beautiful; and the sun, which shone upon it, gave a sparkling brilliance to the whole. The valley on our right hand was ornamented with prodigious glaciers, that, shooting up to an immeasurable height between the mountains, blend their colours with the skies, which they appear to reach. At rs, besides its proper signification, by which it denotes a certain chain of mountains which separate Italy from France and Germany, is frequently used as an appellative to denote any mountains of extraordinary height or extensive range. In this sense, Auvergne and others call the Pyrenean mountains, Alpi; and Gellius the Spanish Alps, Apini Hifpani.

Hence also we say, the British Alps, the Asiatic Alps, the Alps of America.

The Scottish Alps terminate in a most sublime and abrupt manner, at the great promontory the alta Ripa of Ptolemy, the Ord or Ard, i.e. the Height, of Caithness. The upper part is covered with gloomy heaths, the lower is a stupendous precipice, excavated into vast caverns the haunt of cubs and different sea fowl. On the eastern side of the kingdom, this is the striking termination of the vall mountains of Sco land which from its hights, the habitation of the original inhabitants, driven from their ancient seats by the ancestors of the land Scots, descendants of Saxons, French, and Normans; congenial with the English, yet absurdly and invi­diously distinguished from them. Language, as well as striking natural boundaries, mark their place. Their mountains face on the west the Atlantic ocean; wind along the west of Caithness, among which Morvern and Scatraben, Ben-Hop and Ben-Lugal, arise pre-eminent, Sutherland is entirely Alpine, as are Rossberry and Invernesshire. Their Sirmian Alps are, Neal Fourvou­nich, the Coryarich, Benewihand Benevih near Fort­William; the laft of which is reported to be 1450 yards in height. Great part of Aberdeenshire lies in this tract. It boas of another Morvern, soaring far beyond the others. This is the centre of the Grampian hills, and perhaps the highest from the sea of any in Great Britain. They again comprehend the eastern part of Pershire, and finish on the magnificent shores of Lochlomond, on the easter side of which Ben­lomond ripes, distinguished among its fellows. From hence the rest of north Britain forms a chain of hum­bler hills; but in Cumberland, part of Westmorland, Yorkshire, Lancashire, and Derbyshire, the Alps resume their former majesty. A long and tame interval succeeds. The long sublime track of Wales arises, the ancient poſsession of the ancient British race. From the Ord, the great mountains recede inland, and leave a vall flat between their bases and the sea, fronting the waves with a series of lofty rocky precipices, as far as the little creek of Staxico; the whole a bold, but most inhospitable shore for shipping. Wick and Stax­ico have indeed their creeks, or rather chasms, which open between the cliffs, and may accidentally prove a retreat, unless in an eastern wind.

The Asiatic Alps are described under the articles Az­tac Chain and Wetteranian Mountains. The American Alps, are, The Andes of Cordilleras, in South America; and the Appalachian of Alleghany mountains, in North America.

The highest ground in North America is placed by Captain Carver in lat. 57° west long. from Land 90° between a lake from which the Oregon fows, and another called White-bear Lake, from which arises the Missippi.

This excited situation is part of the Shining Mountains, which are branches of the vall chain which pervades the whole continent of America. It may be fairly taken from the southern extremity where Staten Land and Terras del Fuego rise out of the sea as isolated links to an immense height, black, rocky, and marked with rugged fiery tops, frequently covered with snow. New Georgia may be added as another horribly congenial, rising detached farther to the east. The mountains about the Straits of Magellan soar to an amazing height, and infinitely superior to those of the northern hemisphere under the same degree of latitude. From the north side of the Straits of Magellan, they form a continued chain through the kingdoms of Chili and Peru, preferring a course not remote from the Pacific Ocean. The summits, in many places, are the highest in the world. There are not less than 72, which are from 2400 to 3000. Pichincha, wich impends over Quito, is about 35 leagues from the sea; and its summit is 2450 toises above the surface of the water. Cayambe, immediately under the equator, is above 3000; and Chimbo­razo higher than the last by 200. Most of them have been volcanic, and in different ages marked with eruptions far more horrible than have been known in other quarters of the globe. They ex end from the equator through Chili, in which kingdom is a range of volcanoes, from lat. 25. south, to 47. north, and possibly from thence to Terra del Fuego itself, which forming the Straits of Magellan, may have been rent from the continent by some great convulsion, occasioned by their labours; and New Georgia forced up from the same caufe. An unparalleled extent of plain appears on their eastern side. The river of Amazonas runs along a level clothed with forests, after it bursts from its confinement at the Pongo of Borjas, till it reaches its sea-like discharge into the Atlantic Ocean.

In the northern hemisphere, the Andes pass through the narrow Isthmus of Darien into the kingdom of Mexico, and preserve a majestic height and their volcanic disposition. The mountain Popocatepepe made a violent eruption during the expedition of Cortez, which is most beautifully described by his historian An­tonio de Solis. This, probably, is the same volcano observed by the Abbé d'Aulnoy, in his way from Vera Cruz to Mexico; which, from the naked­ness of the lavas, he conjectured to have been but late­
ly extinguished. From the kingdom of Mexico, this branch is continued northward, and tho the east of California, then verges to greatly towards the west, as to leave a very inconceivable space between it and the Pacific Ocean, and frequently detached branches just enter sea, and form promontories; whilst, with parts of the chain itself, were often seen by our navigators in the course of their voyage. Some branches, as we have before observed, extend towards the east, but not to any great distance. A plain, rich in woods and savannas, warm with bison, buffaloes, flags, and Virginian deer, with bears, and great variety of game occupies an amazing track, from the great lakes of Canada, as low as the Gulf of Mexico, and easterly to the other great chain of mountains, the Appalachian, which are the Alps of that side of northern America. Its commencement is supposed to be about Lake Champlain and Lake George, with branches pointing obliquely to the river St Lawrence eastward, and rifting on its opposite coasts; others extending with lowering progress, even into Nova Scotia. The main chain passes through the state of New York, where it is disfigured by the name of the Highlands, and lies within 40 miles of the Atlantic. From thence it recedes from the sea, in proportion as it advances, southward; and near its extremity in southern Carolina is 300 miles distant from the water. It consists of several parallel ridges, divided by most interesting valleys and generally clothed with a variety of woods. These ridges rise gradually from the coast, one above the other, to the central, from which they gradually fall to the west, into the vast plains of the Mississippi. The middle ridge is of an enormous bulk and height. The whole extends in breadth about 70 miles; and in many places leaves great chains for the discharges of the vast and numerous rivers which rise in the bofoms of the mountains, and empty themselves into the Atlantic Ocean, after yielding a matchless navigation to the provinces they water.

Beyond the branch of the Appalachian mountains called the Endless, is another of amazing extent, nearly as high as the mountains themselves. This plain (called the Upper Illinois) is exceedingly rich land; begins at the Mahock’s River; reaches to within a small distance of Lake Ontario; and to the westward forms part of the extensive plains of the Ohio, and reaches to an unknown distance beyond the Mississipi. Vast rivers take their rise, and fall to every point of the compass; into Lake Ontario, into Hudson’s River, and into the Delaware and Susquehanna. The tide of the Hudson’s River flows thro' its deep-worn bed far up, even to within a small distance of the head of the Delaware; which, after a furious course down a long descent, interrupted with rapids, meets the tide not very remote from its discharge into the ocean.

APUXARAS, or ALPAXARES, mountains of Spain, in the Province of Granada, on the Coast of the Mediterranean Sea. They are about 17 leagues in length, and 11 in breadth, reaching from the city of Velez to Almeria. They are inhabited by Moors, who are the remains of the dispersion and ruin of their empire. They embraced the Christian religion; but preserved their own manner of living, and their language, though much corrupted. Here is a rivulet between Pitros and Portugos, which dyes linen that is dipped in it black in an instant. Near this rivulet is a cavern, from which proceeds a malignant fume, that destroys such animals as come near it. The Moors cultivate the soil extremely well, and plant fruit-trees, some of which grow to a prodigious height and thickness, and give the mountains a very agreeable aspect.

ALQUIER, a liquid measure, used in Portugal to measure oil, two of which make an almond. See ALMOND.

ALQUIFON, or ALQUIFOU, is a sort of lead ore, which, when broken, looks like antimony. It is used by the potters to give a green varnish to their works, and thence is called potter’s ore. It is met with in Cornwall, &c. The potters mix a small portion of manganese with the alquifon, and then the varnish of glazing on their ware is of a blackish hue.

ALREDUS, ALBRECHT, or ALBERDUS, of Beverley, one of the most ancient and best English historians. He wrote in the reign of Henry 1. There are no circumstances of his life known with any degree of certainty. It is generally believed that he was educated at Cambridge, and that he afterwards became one of the canons and treasurer of St John’s at Beverley. And we learn in a note of bishop Tanner’s, that, for the sake of improvement, he travelled through France and Italy; and that at Rome, he became canon and titular chaplain to cardinal Othobon. He died in the year 1128 or 1129; leaving behind him the following works: 1. The Annals of Alured of Beverley. Oxford, 1726. Published by Mr Hearne, from a manuscript belonging to Thomas Rawlinson, Esq. It contains an abridgment of the history from Brutus to Henry I. written in good Latin; and with great accuracy. 2. Historiae ecclesiae St Johannis de Beverloro, &c. a manuscript in the Cotton library. It is a collection of records relative to the church at Beverley, translated by our author from the Saxon language. The Biographia Britannica evidently proves these to be all that were written by Alredus.

ALRESFORD, a town of Hampshire, seated on the road from London to Southampton, close by the river Itchen, which feeds a great pond to the left of the town. Part of a Roman highway runs from thence to Alton. It is a rectory, with the rectory of Old Alresford, of L.49:12:8 in the king’s books. It consists of about 200 houses; has one church, two principal streets, which are large and broad; and a small manufacture of linseys.

ALSA, a river of Carniola (Pliny), now the Aupa, running by Aquileia with a short course from north to south, into the Adriatic; where Constanine, the son of Constantine the Great, fighting against Constanis his brother, lost his life.

ALSACE, a province of France, bounded on the east by the Rhine, on the south by Switzerand, on the west by Lorrain, and on the north by the palatinate of the Rhine. It was formerly a part of Germany, but was given to France by the treaty of Munster. It is one of the most fruitful and plentiful provinces of Europe, abounding in corn, wine, wood, flax, tobacco, pulle, fruits, &c. The mountains which divide it from Lorrain are very high, and generally covered with fir, oak, and horn beam. Those on the side of Switzerand are
Alten, Altenh. are lofty high and furnished with all sorts of wood, as well for fuel as building. The country is well diversified with rising hills and fertile vales, besides large forests; but that between the rivers Ill, Main, and the Rhine, as far as Strauburg is inferior to the region about the frequent overflows of the Rhine. In High Alsen there are mines of silver, copper, and lead. They however work none but those of Gromany, from which are annually drawn 1600 marks of silver, each mark being eight ounces; and 24,000 pounds of copper: but the expense of working them is almost equal to the profit. There are iron-works in several parts of Alsen, and particularly at Bedford. There is a mineral spring at Sultibach, near Munster, in High Alsen; which is of great reputation for the bath, weakness of the nerves, and the gravel. The original inhabitants of Alsen are honest and good-natured, but wedded to their own manners and customs. The fruitfulness of their country renders them indolent and inactive; for the Swits make their hay and reap their corn, as well as manage the vintage of High Alsen, which lends a great deal of money out of the province. The common language is the German; however, the better sort of people speak French in the towns, and even in the country, they speak French well enough to be understood.

Alsen, an island of Denmark in the Jæger Bell, or entrance into the Baltic sea, between Slefwick and Sweden, is called the capital of the province. The common language is Danish. It is situated on the river Sæb, now Sfr, and had a well-watered garden for every house; but was ruined by Jenghiz Khan, who took the city, and caused a great number of its inhabitants to be massacred.

Alsheda, a parish of Sweden, in the province of Smaland, where a gold mine was discovered in 1735.

Alsi, in botany, a synonym of the theligonum. See Theligonum.

Alsinastrum, in botany, the trivial name and also a synonym of the clatine. See Clatine.

Alsin, or Chickweed: A genus of the trignia order, belonging to the pentandria class of plants; and, in the natural method, ranking under the 22d order, Caryophylli. The characters are: The calyx is quinquefoilous: The corolla consists of five equal petals, longer than the calyx: The filaments consist of five capillary filaments; the anthers are roundish: The pistilium has an oval germin, three siliform filii, and obtuse stigma: The pericarpium is an ovate unilocular capsule, with three valves: The seeds are roundish and numerous. Of this genus a great number of species are enumerated by some botanical writers; but none of them possess any remarkable properties, except the media, or common chickweed, with white blossoms, which is so well known as to need no particular description. This species affords a notable instance of what is called the sleep of plants: for, every night, the leaves approach in pairs, as to include within their upper surfaces the tender rudiments of the new flowers; and the uppermost pair but one at the end of the stalk are furnished with longer leaf-stalks than the others; so that they can close upon the terminating pair, and protect the end of the branch. The young flowers and leaves, when boiled, can hardly be distinguished from spring spinach. They are deemed refrigerating and nutritious, and an excellent food for persons of a consumptive habit of body. — Swiss are extremely fond of chickweed; cows and horses eat it, sheep are indifferent to it; and goats refuse it.

Alsiniat, in the Mahometan theology, denotes a bridge laid over the middle of hell, finer than a hair, and sharper than the edge of a sword, over which people are to pass, after their trial, on the day of judgement. To add to the difficulty of the passage, Mahomet affuirs, that the alligator, narrow as it is, is beset with briars and thorns; and even in the path of the good, will be an impediment to the good, who shall fly over it like the wind; Mahomet and his muflemen lean the way; whereas the wicked, by the narrowness of the path, the entangling of the thorns, and extinction of the light which directed the former to paradise, will soon mis their footing, and tumble headlong into hell, which is gaping beneath to receive them.

Alsiem, a city of ancient Etruria, occupying (according to Calverius) the spot on which Fiji now stands. We are told by Dionysius Halicarnassenis, that Almus was built by the Aborigines, long before the Tyrrhenians invaded Italy. In this case it must have been founded not long after the dispersion in the days of Teleg. Its founder is said to have been one Alsiem, Aescul, or Alita; whom some conjecture to have been Altith, or Eliina, the son of Javan mentioned in scripture.

Alsons (Anthony), a divine and poet, was educated at Westminster-school, and thence elected to Christ-church, Oxford, where he took the degree of M. A. in March 1665, and of B. D. in Decem. 1706. On his coming to the university, he was very soon distinguished by Dean Aldrich, and published Fabula- rum Euyperianum Letalis, Oxon. 1685, 8vo. with a poetical dedication to lord viscount Sandamore, and a preface in which he took part against Dr Bentley in the famous dispute with Mr Boyle. He passed through the usual offices in his college to that of censor with considerable reputation; and for some years had the principal noblemen and gentlemen belonging to the society committed to his care. In this employment he continued till his merit recommended him to Sir Jonathan Trelawney, bishop of Winchester, who appointed him his chaplain, and soon after gave him a prebend in his own cathedral, together with the rectory of Brightwell in the county of Berks, which afforded him ample provision for a learned retirement, from which he could not be drawn by the repeated solicitations of those who thought him qualified for a more public character and a higher station. In 1717 an action was brought against him by Mrs Elizabeth Alfrey of Oxford, for a breach.
ALS

breach of a marriage contract; and a verdict obtained against him for 2000l. which probably occasioned him to leave the kingdom for some time. His death, which happened June 10, 1726, was occasioned by his falling into a ditch that led to his garden-door. A quarto volume was published in 1752, under the title of Antiquari Aesopi, &c. with English and Latin libri duo. Four English poems of his are in Dodgley’s Collections, one in Pearch’s, several in the early volumes of the Gentleman’s Magazine, and some in “The Student.” Mr Allop is respectfully mentioned by the incautious Dr King of the Commons (vol. I, p. 256), as having enriched the commonwealth of learning, by “Translating IPables from Greek, Hebrew, and Arabic;” and not less detracingly by Dr Bentley, under the name of “Tony Allop, a late editor of the Asiopan Fables.”

Allop (Vincent), an eminent divine, was educated in St John’s College in Cambridge, where he took the degree of Master of Arts. He received deacon’s orders from a bishop, after which he went down to Rutlandshire, and settled at Oakham, where he was an assistant to the master of the free-school. As he was a man of a sprightly turn, he fell there into indifferent company; but was reclaimed by the frequent admonitions of the reverend Mr Benjamin King. He afterwards married that gentleman’s daughter, and becoming a convert to his principles, received ordination in the Presbyterian way, not being satisfied with that which he had from the bishop. He was settled at Willes in the county of Northampton, whence he was ejected in 1662, for nonconformity. After this he ventured to preach sometimes at Oakham, and at Wellingborough where he lived, and was once six months in prison for praying by a sick person. A book he wrote against Dr Sherlock in a humorous style, made him well known to the world, and induced Mr Cawton, an eminent nonconformist in Willemington, to recommend him to his congregation for his successor. On receiving this call, he quitted Northamptonshire and came to London, where he preached constantly, and wrote several pieces which were extremely well received by the public. His living in the neighbourhood of the court exposed him to many inconveniences; but these ended with the reign of Charles II, or at least in the beginning of the next reign, when Mr Allop’s son engaging in treasonable practices was freely pardoned by king James. After this our divine went frequently to court, and is generally supposed to have been the person who drew the Presbyterian’s address to that prince for his general indulgence. After the revolution, Mr Allop gave very public testimonies of his affection for the government; yet upon all occasions he spoke very respectfully of king James, and retained a very high sense of his clemency in sparing his only son. The remainder of his life he spent in the exercise of his ministry, preaching once every Lord’s day; besides which he had a Thursday lecture, and was one of the lecturers at Plincker’s hall. He lived to be a very old man, and preserved his spirits to the last. On grave subjects he wrote with a becoming seriousness; but where wit might properly be shown, he displayed his to great advantage.

His funeral sermon preached by Mr Slater, and his memory will be always preserved by his own learned and elegant writings. Of these the most remarkable, besides his sermons, are, 1. Anti-fozes; in vindication of some great truths opposed by Dr William Sherlock, 8vo, 1675. 2. Reliquiae Anglicanae; in answer to Dr Goodman’s Compendious Enquiry, 8vo, 1679. 3. The Mitchell of Impostures; in answer to Dr Dillingham’s Hitchick of Separation, 1680. 4. A faithful Re-proof to a False Report, with reference to the Differences among the United Dissenters in London, 8vo.

ALSTEDIUS (Joan-Henry), a German Protestant divine, and one of the most indefatigable writers of the 17th century. He was some time professor of philosophy and divinity at Herborn in the county of Nassau: from hence he went into Transylvania, to be professor at Alba Julia; where he continued till his death, which happened in 1638, being then 50 years of age. His Encyclopaedia has been much extolled even by the Roman Catholics; it was printed at Lyons, and sold very well throughout all France. His Theofanae Chronicagineae is by some esteemed one of his best works, and has gone thro’ several editions. He also wrote Triumphus Bibliorum, to show that the principles of all arts and sciences are to be found in the Scriptures; but he gained very few to his opinion. He was a Millenarian; and published, in 1627, a tractate De milie annis, in which he asserted that the reign of the saints on earth was to begin in 1694.

ALSTON-MORE, a town in Cumberland, feared on a hill; at the bottom of which runs the river Tyne, with a stone bridge over it. Near this place is plenty of lead ore. W. Long 2. 4. N. Lat. 34. 45.

ALSTONIA, in botany; a genus of the monogynia order, belonging to the hexandria class of plants. The characters are: The calyx is a perianthium beneath, imbricated: The corolla is monopetalous, and shorter than the calyx; the border expanding, eight or ten parted, with alternate divisions: The stamina consist of numerous short filaments, the exterior ones longer; the anther are orbicular and furrowed: The pistillum has a small ovate germe above; a simple stylus the length of the corolla, filiform and erect; the stigma inverase egg-headed. There is but one species, the theasformis, a native of America.

ALSTROEMERIA, in botany: A genus of the monogynia order, belonging to the hexandria class of plants; and, in the natural method, ranking under the 11th order, Sarmentaceae. The characters are: There is no calyx: The corolla is nearly bilabiated; and consists of five petals, the two inferior tubular at the base: The stamina consist of six filabulated filaments, declining and unequal; the anther oblong: The pistillum has an hexangular germe beneath; the stylus declining, filiform, the length of the stamina; and three oblong bifid stigmae: The pericarpm is a roundish hexangular capsule, with three cells and three valves: The seeds are globular and numerous. There are five species, natives of Italy and Peru.

ALT, in music, a term applied to the high notes in the scale.

ALTAIC CHAIN, a range of mountains which bounds Asia on the south. It begins at the vallus mountain Bogdo, passes above the head of the Iriffich, and then takes a course zigzag, precipitous, clothed with snow, and rich in minerals, between the Iriffich and Obj
ALTAR, a very handsome town in Italy, in the kingdom of Naples, and in Calabria Citerior, 15 miles north-west of Bagnigno. E. Long. 16. 22. N. Lat. 30. 40.

ALTAMURA, a town of Naples, in the territory of Bari, with the title of a principality, seated on the foot of the Apennine mountains. E. Long. 16. 54. N. Lat. 41. 0.

ALTAR, a place upon which sacrifices were anciently offered to some deity. The heathens at first made their altars only of turf; afterwards they were made of stone, of marble, of wood, and even of horn, as that of Apollo in Delos.

Altars differed in figure as well as in materials. Some were round, others square, and others triangular. All of them were turned towards the east, and stood lower than the figures of the gods; and were generally adorned with sculptures, representing either the gods to whom they were consecrated, or their symbols. See the PAGAN ALTARS represented on Plate XI. Upon the fides of No. 1. a trident and two dolphins are exhibited, which denote it to have been dedicated to Neptune. No. 2. a four square altar, was dedicated to the nymphs, as the inscription imports. No. 3. exhibits a Bacchus holding a thyrsus in his hand, a mark of the altar's being built to Bacchus: it had two other fides, which made it appear triangular. Of No. 4. which was also triangular, each face or side exhibited a genius, one of whom (on the side represented) carries an ear upon his neck, which seemed to denote it an altar of Neptune. No. 5. an altar of a round shape, is inscribed Arca Neptuni: the god himself is there represented, all naked, giving the pallium upon his shoulder; and holding in his left hand a trident, and in his right a dolphin.

The height of altars also differed; according to the different gods to whom they were consecrated. According to Servius, those altars set apart for the honour of the celestial gods, and gods of the higher class, were placed on some pretty tall pile of building; and for that reason were called altares from the words alta and arae, "a high elevated altar." Those appointed for the terrestrial gods were laid on the surface of the earth, and called arae. And, on the contrary, they dug into the earth and opened a pit for those of the infernal gods, which they called obelica, "serpulicula." But this distinction is not everywhere observed; the best authors frequently use arae as a general word, under which are included the altars of the celestial and infernal, as well as those of the terrestrial, gods. Witsers Virgin, Eccl. 5.

---En quatuor arat.

Where arae plainly includes altaria; for whatever we make of Daphnis, Phoebus was certainly a celestial god. So Cicero, pro Quinct. Arae delibragas Hecules in Grecia victimas. The Greeks also distinguished two sorts of altars; that whereon they sacrificed to the gods was called aedes, and was a real altar, different from the other whereon they sacrificed to the heroes, which was smaller, and called sagittas. Pollock makes this distinction of altars in his Onomasticon: he adds, however, that some poets used the word sagitta for the altar whereon sacrifice was offered to the gods. The Septuagint version does sometimes also use the word aedes for a fort of little low altar, which may be expressed in Latin by easticula; being a hearth rather than an altar.

Before temples were in use, altars were erected sometimes in groves, sometimes in the highways, and sometimes on the tops of mountains; and it was a custom to engrave upon them the name, ensign, or character, of the deity to whom they were consecrated.

In the great temples of ancient Rome there were ordinarily three altars: the first was placed in the sanctuary, at the foot of the statue of the divinity, upon which incense was burnt and libations offered; the second was before the gate of the temple, and upon it they sacrificed the victims; and the third was a portable altar, upon which was placed the offering and the sacrificial vessels.

Besides these uses of altars, the ancients swore upon them, and swore by them, in making alliances, confirming treaties of peace, and other solemn occasions. Altars also served as places of refuge to all those who fled to them, whatever crime they had committed.

Altars are doubtless as ancient as sacrifices themselves; consequently their origin is not much later than that of the world; Gen. ch. iv. Some attribute their origin to the Egyptians; others to the Jews; others to the patriarchs before the flood. Some carry them as far back as Adam, whose altar is much more ancient than by Jewish, and even Christian writers. Others are contented to make the patriarch Enoch the first who consecrated a public altar. Be this as it will, the earliest altars we find any express testimony of are those erected by Abraham.

Altars, in the patriarchal times, were very rude. The altar which Jacob set up at Beth-el was nothing but a stone, which served him instead of a bolder; that of Gideon, a stone before his bones: and the first which

God
God commanded Moses to erect was probably of earth, or unpurified stones, without any iron; for if any thing was made of that metal, the altar was declared impure.

The principal altars of the Jews were, The altar of incense; that of burnt-offering; and the altar, or table, for the show-bread.

The altar of incense was a small table of shittim-wood, covered with plates of gold; of one cubit in length, another in width, and two in height. At the four corners, were four kinds of horns, and all round a little border or crown over it. This was the altar hidden by Jeremiah before the captivity; and upon it the officiating priest offered, every morning and evening, incense of a particular composition. See Plate XI.

The altar of burnt-offerings was made of shittim-wood, and carried upon the shoulders of the priests by staves of the same wood overlaid with brass. In the time of Moses, this altar was five cubits square and three high; but in Solomon's temple it was much larger, being 20 cubits square and 10 in height. It was covered with brass; and at each corner was a horn or spire, wrought out of the same wood with the altar, to which the sacrifices were tied. Within the hollow was a grate of brass, on which the fire was made; through it fell the ashes, and were received in a pan below. At the four corners of the grate were four rings and four chains, which kept it up at the horns. This altar was placed in the open air, that the smoke of the burnt-offerings might not fully the inside of the tabernacle. See Plate XI.

The altar, or table, for the show-bread, was likewise of shittim-wood, covered with plates of gold, having a little border round it, adorned with sculpture. It was two cubits long, one wide, and one and an half in height. Upon this table, which stood in the holy of holies, were put, every sabbath-day, 12 loaves, with salt and incense.

The Jewish altars, after their return from the captivity, and the building of the second temple, were in some respects different from those described above. That of burnt-offerings was a large pile, built of unhewn stone, 32 cubits square at the bottom, and 24 square at the top. The ascent was by a gentle rising, 32 cubits in length, and 16 in breadth.

Altar, or altar, is also used among Christians for the communion-table.

In the primitive church, the altars were only of wood; as being frequently to be removed from place to place. But the council of Paris, in 509, decreed that no altar should be built but of stone.—At first there was but one altar in each church; but the number soon increased; and from the writings of Gregory the Great, who lived in the sixth century, we learn; that there were sometimes in the same church 12 or 13. In the cathedral of Magdeburg there are no less than 49 altars.

The altar is sometimes supported on a single column; as in the subterraneous chapels of St Cecilia, at Rome, &c.; and sometimes by four columns, as the altar of St Sebastian of Crypta Aretinana; but the customary from is, to be a massive of stone-work, sustaining the altar-table. These altars bear a resemblance to tombs: to this purpose, we read in church history, that the primitive Christians chiefly held their meeting at the tombs of the martyrs, and celebrated the mysteries of religion upon them for which reason, it is a standing rule to this day in the church of Rome, never to build an altar, without including the relics of some saint in it.

Altar-thane, or Altarist, in old law-books, an appellation given to the priest or parson of a parish, to whom the altarage belonged. See Altarage.

Altarage, in law, altars erected in virtue of donations before the Reformation, within a parochial church, for the purpose of singing of masses for deceased friends. Altarage likewise signifies the profits arising to the priest on account of the altar.

Altayeff, a town of Huzza, a district of Arabia Felix. It is situated about 60 miles east of Mecca, behind mount Gazwan, where the cold is more intense than in any other part of the district, but the air very wholesome. Its territory abounds in fountains, and produces excellent raisins. The town is surrounded with a wall but is not very large.

Altendorf, a large handsome town in Switzerland, and the chief of the canton of Uri. It is situated below the lake of the four cantons, in a plain, at the foot of a mountain, whose pavilages are difficult, and serve instead of fortifications. It has four churches and two convents: St Martin's and that of the Holy Cross are the finest. The town-house, and the arsenal are also worth seeing. E. Long. 8. 30. N. Lat. 46. 50.

Altea, a sea-port town of Valencia, in Spain. It was taken in 1703, in favour of the archduke Charles; but lost after the battle of Almanza. W. Long. 0. 15. N. Lat. 46. 44.

Altemburg, a town of Transylvania, 17 miles S. W. of Wittenburg, and 35 S. of Claunenburg. E. Long. 23. 5. N. Lat. 46. 25.

Altenburg, a sea-port town of Germany, in the duchy of Holstein, in Lower Saxony. It is a modern town, built by the king of Denmark, and was burnt by the Swedes in 1712; but has since been beautifully rebuilt. The merchants brought from Asia, by the Danish East-India company is sold here. E. Long. 10. 6. N. Lat. 52. 51.

Altenburg, an ancient town in Germany, situated on the river Pleis, with a good castle placed on a rock, in Mifia, in the circle of the Upper Saxony. It was formerly an imperial city, but a present belongs to the house of Saxony. Here is a college which has always been in a flourishing condition. In 1703, there was a nunnery founded for women of high rank, who are Protestants. E. Long. 15. 8. N. Lat. 50. 59.

Altenburg, a small fortified town of Hungary, in the territory of Mofon, near the Danube, about 53 miles from Vienna. E. Long. 35. 30. N. Lat. 48. 15.

Altenburg, or Oswar, a small but strong town of Hungary seated in a marsh, with wide streets. It is near the river Danube, and is surrounded with deep ditches. It is 15 miles from Prague, 40 south-east of Vienna, and 63 south-west of Buda. E. Long. 17. 56. N. Lat. 44. 0.

ALTE
ALTERANTS, or ALTERNATIVE Medicines, such as correct the bad qualities of the blood and other humours, without occasioning any sensible evacuation.

ALTERNATION, in physics, the set of changing the circumstances and manner of a thing; its general nature and appearance remaining the same. Or, it is an accidental and partial change in a body, without proceeding so far as to make the subject quite unknown, or to take a new denomination thereupon. Or, it may be defined, the acquisition or loss of such qualities as are not essential to the form of the body. Thus, a piece of iron, which before was cold, is said to be altered, when it is made hot; since it may still be perceived to be iron, is called by that name, and has all the properties thereof. By this alteration is distinguished from generation and corruption; these terms expressing an acquisition or loss of the essential qualities of thing.

The modern philosophers, after the ancient philosophers, and corporelarians, hold all alteration to be effected by means of local motion. According to them, it always consists either in the emulsion, accession, union, separation, or transposition, of the component particles.

ALTERNATION, a debate or contest between two friends or acquaintance. The word comes from alterari, which anciently signified to converse or hold different opinions. Thus, they say, they never come to an open quarrel, but there is continually some little alteration or other.

ALTERATION, a change or alteration of some thing propounded. This is also called permutation, &c. and is easily found by a continual multiplication of all the numbers, beginning at unity. Thus, if it be required to know how many changes or alterations can be run on six bells, multiply the numbers 1, 2, 3, 4, 5, 6, continually into one another; and the last product gives the number of changes.

ALTERNATIVE, is particularly used for the choice of two things propounded. In this sense, we say, to take the alternative of two propositions.

ALTHEA, MARSHMALLOW: A genus of the polyantha order, belonging to the monadelphia class of plants; and, in the natural method, ranking under the 37th order, Compositae. The characters are: The calyx is a double perianthus, the exterior one nectarifer: The corolla consists of five petals, conflated at the base: The flava of numerous filaments is the anther; and these are hairy. The piliferous has an orbicular generum; a short cylindrical stylus; and numerous brightly stigmatic, the length of the stylus: The pericarpium consists of numerous arillus: The seeds are solitary, and kidney-shaped. There are three

Species. 1. The vulgaris, or common marshmallow, is a native of Britain, and hath a perennial root, and an annual stalk, which perishes every autumn. The stalks grow erect to the height of four or five feet. These are garnished with leaves which are hoary, soft to the touch, and placed alternately on the branches. The flowers come out from under the wings of the seeds, like the willow, and are of a purplish white. 2. The brizula, or hairy marshmallow, is a native of Spain and Portugal. It is a low plant, whose branches trail on the ground, unless they are supported by stalks. The leaves and stalks are beft with strong hairs, the flowers come out like those of the common sort, but are smaller, and have purplish bottoms. 3. The cannabina, or hirsute marshmallow, is a native of Hungary and Italia. It has a woody stem, which rises to the height of four or five feet; and puts out many side-branches. The flowers come out in the same manner as in the others, but are of a deeper red colour. This sort is called the first year, unless the fummer proves warm; but when the plants live through the winter, they will flower early in the following summer, and produce good seeds.

Culture. Though the first sort is found naturally in salt marshes, it will thrive when transplanted into any soil, or in any situation; however, it will always grow larger in moist than in dry soil. It may be propagated either by parting the roots in autumn when the stalks decay, or by fowing the seeds in the spring. If the seeds of the second species are sown in April, the plants will flower in July, and carry ripe seed in September. They ought to be sown in the places where they are to remain, as the roots shoot deep in the ground; so that unless the plants are removed very young, they seldom survive it. The seeds of the cannabina ought also to be sown where the plants are to remain, for the reason just now given. They should have a sheltered situation and dry soil, otherwise they will not live through the winter. Indeed they seldom continue in Britain above two years, with all the care that can be taken of them.

Medicinal Uses. The first is the only species used in medicine. The whole plant, especially the root, is abundant with a mild mucilage. It has the general virtues of an emollient medicine; and proves serviceable in a thin acrimonious state of the juices, and where the natural mucus of the intestines is abraded. It is chiefly recommended in sharp defluxions upon the lungs, hoarseness, dysesthesias; and likewise in nephritie and calculous complaints: not, as some have supposed, that this medicine has any peculiar power of dissolving or expelling the calculi; but as, by lubricating and rendering the vessel, it procures a more free and easy passage. The root is sometimes employed externally for softening and maturating hard tumours; though it is said to give rise in difficult dentition of children.

This root gave name to an official syrup, decoction,
II. the compound, This heights, whether river on foot, but the southern; of it is.

Altitude, or Equal Altitude Instrument, is that used to observe a celestial object when it has the same altitude on the east and west sides of the meridian. See Astronomy, the last section.

Altitude in astronomy, is the distance of a star, or other point, in the mundane sphere, from the horizon.

This altitude may be either true or apparent. — If it be taken from the rational or real horizon, the altitude is said to be true or real; if from the apparent or sensible horizon, the altitude is apparent. — Or, rather, the apparent altitude is such as it appears to our observation; and the true is that from which the refraction has been subtracted.

The true altitudes of the sun, fixed stars, and planets, differ but very little from their apparent altitudes; because of their great distance from the centre of the earth, and the smallness of the earth's semidiameter, when compared thereto. But the difference between the true and apparent altitude of the moon is about 52. This subject is further explained under Astronomy.

Altitude, in geometry, is that of a thing, whether accessible or inaccessible. See Geometry.

The method of taking considerable terrestrial altitudes, of which those of mountains are the greatest, by means of the barometer, is very easy and expeditious. It is done by observing, on the top of the mountain, how much the mercury has fallen below what it was at the foot of the mountain. See Barometer.

Altitude of the Eye, in perspective, is a right line let fall from the eye, perpendicular to the geometrical plane.

Altitude, in geometry, is the distance of a star, or other point, in the mundane sphere, from the horizon.

This altitude may be either true or apparent. — If it be taken from the rational or real horizon, the altitude is said to be true or real; if from the apparent or sensible horizon, the altitude is apparent. — Or, rather, the apparent altitude is such as it appears to our observation; and the true is that from which the refraction has been subtracted.

The true altitudes of the sun, fixed stars, and planets, differ but very little from their apparent altitudes; because of their great distance from the centre of the earth, and the smallness of the earth's semidiameter, when compared thereto. But the difference between the true and apparent altitude of the moon is about 52. This subject is further explained under Astronomy.

Altitude Instrument, or Equal Altitude Instrument, is that used to observe a celestial object when it has the same altitude on the east and west sides of the meridian. See Astronomy, the last section.

Altitude in astronomy, is the distance of a star, or other point, in the mundane sphere, from the horizon.

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ed all marks of distress the moment he was removed from his presence, and now thought of nothing but Alvarés. He was therefore recalled; and, being invested with his usual authority, revenged himself severely upon his enemies, by perfuming the king to banish them. Of the 45 years he spent at court, he enjoyed for 30 of them to entire an ascendency over the king, that nothing could be done without his express orders: nay, it is related by Mariana, that the king could not change an officer or servant, or even his clothes or diet, without the approbation of Alvarés. In short, he wanted nothing to complete his grandeur but the name of king: he had all the places in the kingdom at his disposal; he was master of the treasury, and by bounties had gained the hearts of the subjects, that the king, though his eyes now were opened, and his affections sufficiently turned against him, durst not complain. But the day of reckoning was approaching, and at length he was seized: yet not directly, openly, and violently, but with some of that management which upon a similar occasion was formerly employed by Tiberius against Sejanus. During his confinement, however, several attempts to speak to the king in person; but not being able to effect this, he sent the following letter, from which, as well as from the rest of Alvarés’s history, all court favourites may draw abundant matter for edification and instruction. “Sir, it is five and forty years since I was admitted into your service. I do not complain of the rewards I have received; they were greater than my merits or expectation, as I shall not deny. There was but one thing wanting to complete my happiness; and that was to have fixed proper limits in time to this great fortune of mine. While, instead of choosing retirement, after the example of the greatest men, I still continued in the employment, which I thought not only my duty, but necessary for your interest; I fell into this misfortune. It is very hard that I should be deprived of liberty, when I have risked life and fortune more than once to restore it to you. Grief prevents me from saying more. I know that the Delity is provoked against me by my sins; but it will be sufficient for me, if his anger is appeased by the calamities I now suffer. I can no longer bear that prodigious mass of riches, which it was wrong in me to have heaped together. I should willingly resign them, but that every thing I have is in your power; and I am denied the opportunity of showing mankind, that you have raised a person to the height of greatness, who can contain wealth as well as procure it, and give it back to him from whom he received it. But I desire you in the strongest terms, that, as I was obliged by the looseness of the treasury to raise 10,000 or 15,000 crowns by methods I ought not to have taken, you will restore them to the persons from whom they were extorted. If you will not grant this on account of the services I have done, yet I think it necessary to be done from the reason of the thing.”

This letter, however, produced no effect in his favour: Alvarés was tried, and condemned to lose his head. After condemnation, he was removed to Valladolid; and, having confessed himself, and received the sacrament, he was carried, on a mule to the market-place, in
in the middle of which a large scaffold was erected. Mounting the scaffold, he paid reverence to the crofs, and presently gave his hat and lignet to his page, saying, "This is the last gift you will ever receive from me." He then submitted himself to the axe with the utmost intrepidity. Dr. Geddes relates, that he was executed the 4th of June, others the 5th of July, 1453.

ALUDELIS, in chemistry, are earthen pots without bottoms, inferted into each other, and used in sublimations.

ALVEARIUM, in anatomy, the bottom of the conchus, or hollow of the outer ear.

ALVEARIUM also signifies a bee-hive. The word is formed of alveo, a "channel or cavity"; in allusion to the alveoli, or cells in bee-hives.

Some of the ancients use also the word alvearium for a bee-hive, more usually called among others the alvearii, or cells in bee-hives.

In medicine it is of considerable use as an astringent and tonic. It is reckoned particularly serviceable for restraining hemorrhages, and immoderate secretions from the blood; but less proper in intestinal fluxes. In violent hemorrhages, it may be given in doses of 15 or 20 grains, and repeated every hour or half hour till the bleeding abates; in other cases, smaller doses are more advisable; large ones being apt to nauseate the stomach, and occasion violent confluxions of the bowels. It is used also externally, in astringent and repulsive lotions and collyria. Burnt alum taken internally has been highly esteemed in cases of colic. In such instances, when taken to the extent of a scruple for a dose, "it has been found gently to move the belly, and give very great relief from the severe pain. Its official preparations are, for internal use, polius foplicenus, and aqua foplicina externus applications, the aqua aluminis, and quassium aluminis and alumnum aluminis;" which last is no other than the alum dried by fire, or freed from the watery moisture, which, like other alums, it always retains in its crystalline form. By this...
ALUM mines are said to have been first found in Italy in the year 1460; and in 1506 King Henry VII. made a monopolizing grant of this commodity to Angeline Chigi, a merchant of Sienna. In the year 1608 the manufacture of alum was first invented, and successfully practised in England, meeting with great encouragement in Yorkshire, where it was first made, from Lord Sheffield, and other gentlemen of that county. King James I. by advice of his ministry, assumed the monopoly of it to himself, and therefore prohibited the importation of foreign alum; and in 1635 the importation of it was further prohibited by the proclamation of Charles I.

ALUM-works, places where alum is prepared, and manufactured in quantities for sale. They differ from alum-mines, as in the former an artificial alum, and in the latter natural alum, is produced.

ALUNTIIUM, Aluminiolum, (anc. geog.) a town in the north of Sicily, situated on a steep eminence, at the mouth of the Chydas; said to be as old as the war of Troy. Now in ruins; from which arose the hamlet St Filadelfo, in the Val di Demona. The inhabitants were called Haluntinii.

ALVUS, in anatomy, a term used for the belly in general, but more-frequently applied to the bowels.

ALWAIDI! a feft of Mahometans who believe all great crimes to be unpardonable. — The Alvidi stand in opposition to the Morghi. They attribute less efficacy to the true belief in the salvation of men than in the feet of the Muffelmanns.

ALYSSUM, Alyson, or Alysoides, Madwort; (from a reason, to be mad; because it was believed to have the property of curing madness): A genus of the fricculosa order, belonging to the tetradynamia class of plants; and, in the natural method, ranking under the 30th order, Siliquosa. The characters are: The calyx is an oblong four-leaved perianthium: The corolla consists of four cruciform petals; with claws the length of the calyx; the petals shorter; The filamina consist of six filaments, the length of the calyx; two of them rather shorter and denticulated; the anther is crociform and expanding; The pistillum has an ovate germen; the stylus is simple, and the length of the filamina; the stigma is obtuse: The pericarp is a sub-globular emarginated siliqua, furnished with a bilocular stylus, having an elliptic partition; the seeds are few, orbicular, and affixed to filiform receptacles.

Species. Of this genus, Linnaeus enumerates 19 species; but none of them are remarkable either for beauty, or any other property, except the hallifimum; and madwort with whole spear-shaped leaves. This spreads itself upon the ground, and never rises to any height. It produces, at the extremity of its branches, very pretty racemes of small white flowers; of which it is seldom defitute for six or seven months successively; for which reason it well deserves a place in the gardens of the curious.

Culture. Though these plants are natives of the southern parts of Europe; yet, if planted on a dry, lean, or rubbishy soil, they will endure the severest winds in the open air. — The hallifimum is a plant continues about two or three years, and must therefore be often transplanted; or if the seeds are suffered to fall, the plants will rise without any trouble. It may also be propagated by cuttings, which ought to be planted in April or May, and are very apt to take root, if kept shaded in the heat of the day, and gently refreshed with water.

This plant, as already observed, was thought to cure some kinds of madness; but the present practice has entirely rejected it for this or any other purpose.

ALYTARCHA, a priest of Antioch in Syria, who, in the games instituted in honour of the gods, prevailed over the officers who carried rods to clear away the crowd and keep order.

In the Olympic games, the Alytarsha had the same command, and obliged every person to preserve order and decency.

ALZIRA, a town of Spain, in the kingdom of Valencia, seated on the river Xucar, E. Long. 0. 20. N. Lat. 39. 10.

AMA, in ecclesiastical writers, denotes a vessel wherein wine, water, or the like, were held, for the service of the eucharist. In this sense the word is also written amula; sometimes also hama, and hamula.

AMA is sometimes allowed for a wine measure, as a cafe, pipe, or the like.

AMABYR, a barbarous custom which formerly prevailed in several parts of England and Wales, being a sum of money paid to the lord when a maid was married within his lordship. The word is old British, and signifies "the price of virginity."

AMADABAT, a corruption from AHMED ABAD or Ahmed's city; (so called from a king of that name); a large and populous city of Indostan, and the capital of the province of Guzerat. It is situated in E. Long. 72. 12. N. Lat. 23. 0. Amadabat was formerly called Ghurabad, Guzerat; and by Shah Jehan nicknamed Chero-nabad, or "the habitation of dust," because it was much in-commoded therewith. It was the seat of the Guzerat kings, as it is now of the Mogul governor. The city stands in a beautiful plain; and is watered by the little river Schirnetti, which, though not deep, in time of rains overflows the plains prodigiously. The walls are built with stone and brick, shaded at certain distances with great round towers and battlements. It has twelve gates; and, including the suburbs, is about four miles and a half long. The streets are wide. The meydán bâdad, or king's square, is 700 paces long and 400 broad, planted round with trees. On the west side is the castle, well walled with fine stone, and as spacious as a little city; but its inward appearance is not conformable to its external magnificence. The caravansera is on the south of the square, and its chief ornament. Near the meydán also is the king's palace, whose apartments are richly ornamented; and in the midst of the city is the English factory, where they purchase fine chintz, caleecees, and other Indian merchandise. The place is full of gardens flored with fruit-trees, that from an eminence it looks like a wood. The Hindoos have here an hospital for sick beasts, and another for sick birds, which they take great care of. According to some late accounts, this city is little inferior to the best in Europe, and is thought to yield ten times as much revenue as Surat.

AMA, the
AMA

AMADAN, or Hamadan, a town of Persia, between Taurus, and Ipsphan. E. Long. 47° 4'. N. Lat. 41° 30'. It is seated at the foot of a mountain, where there are a great many springs, which water the adjacent country. The extent of the city is very large; and there are a great many waste spots within it, as well as cultivated land. The houses are built of brick hardened in the sun, and have but a very indistinct aspect. There is but one tolerable street; and that is where stuffs, garments, and the like, are exposed to sale: it is straight, long, and wide; and the shops are very well furnished. The adjacent parts are fruitful in corn and rice, in such that the neighbouring provinces are supplied from hence. It is famed to enjoy a very fabulous air, but the cold in winter is intense. The Armenians have a church in this town, but it is a very ill-contrived structure. The Jews have a synagogue near a tomb, where they pretend Esther and Mordecai interred. To this place they come in pilgrimage from several parts of the Levant. About a league from Amadan, there is a mountain called Naithaa, which abounds with all sorts of curious herbs. In the ring, people flock to this mountain from all parts to recover their health, by sucking in the sulphurous effluvia with their breath.

Amadan is a very ancient city. It is said to have been destroyed by Nebuchadnezzar, and rebuilt by Darius, who brought hither all his riches. The kings of Persia frequently retired to this place on account of its delightful situation; for which reason it obtained the name of the Royal city. It was conquered by the khalif Othman, and narrowly escaped being destroyed by Jenghiz Khan in 1220. It had then strong walls and a good castle, which are now in ruins. Its present beauty consists in its gardens and springs.

AMADANAGER, a town in the hither peninsula of India, in the province of Decan. E. Long. 74° 11'. N. Lat. 18° 10'.—It was taken by the Moguls in 1592, after a siege of six months; being at that time defended by a strong castle, situated on an eminence, and surmounted with deep ditches, into which several springs discharged their waters.

AMADIA, a trading town of Aegina, in Curdiistan, belonging to the Turks; seated on a high mountain. E. Long. 43° 1'. N. Lat. 36° 25'.

AMADOV, a kind of black-match, tinder, or touch-wood, which comes from Germany. It is made of a sort of large mushrooms, or spungy excreences, which commonly grow on old trees, especially oaks, ash, and firs. This substance being boiled in common water, and afterwards dried and well beaten, is to be put into a strong lye prepared with salt-petre, after which it is again put to dry in an oven. The druggists sell this match wholesale in France, and several hawkers retail it. Some give to the amado the name of Pyrotechnical Sponge, because of its aptness to take fire.

AMADORY, a kind of cotton which comes from Alexandria, by the way of Marselles.

AMAIN, in the sea-language, a term importing to lower something at once. Thus, to strike amain, is to lower, or let fall, the top-falls; to wave amain, is to make a signal, by waving a drawn sword, or the like, as a demand that the enemy strike their top-falls.

AMAC, a small island in the Baltic sea, near Copenhagen, from which it is separated by a canal, over which there is a draw-bridge. Amak is about four miles long and two broad; and is chiefly peopled by the descendants of a colony from East Friesland, to whom the island was configned by Christian II. at the request of his wife Elizabeth, sister of Charles V., for the purpose of supplying her with vegetables, cheese, and butter. From the intermarriages of these colonies with the Danes, the present inhabitants are chiefly descended; but as they wear their own dress, and enjoy peculiar privileges, they appear a distinct race from the natives. The island contains about six villages, and between 3000 and 4000 souls. It has two churches, in which the ministers preach occasionally in Dutch and Danish. The inhabitants have their own inferior tribunals; but in capital offences are amenable to the king's court of justice at Copenhagen. The old national habit, brought by the original colony when they first migrated to the island, is still in use amongst them. It resembles the habit of the ancient Quakers, as represented in the pictures of the Dutch and Flemish painters. The men wear broad-brimmed hats, black jackets, full glazed breeches of the same colour, loose to the knee, and tied round the waist. The women were drest chiefly in black jackets and petticoats, with a piece of blue glazed cloth bound round their heads. The island is laid out in gardens and pastures; and till, according to the original design, supplies Copenhagen with milk, butter, and vegetables. E. Long. 12° 19'. N. Lat. 55° 20'.

AMAL, a town of Sweden, in the province of Daland, seated on the river Wefer. It has a good harbour; and carries on a great trade, especially in timber, deals, and tar. E. Long. 40° 40'. N. Lat. 58° 50'.

AMALEK, the son of Eliphaz, by Timna his concubine, and the grandson of Eau. Gen. xxxvi. 12. and 1 Chr. i. 36. Amalek succeeded Gatam in the government of Edom. He was the father of the Amalekites; a powerful people who dwelt in Arabia Petraea, between the Dead Sea and the Red sea, or between Havila and Shur (1 Sam. xv. 7.); sometimes in one canton, and sometimes in another. It does not appear that they had cities: for there is no mention of any but one in the Scriptures (id. ib 5.); they living generally in hamlets, caves, or tents.

The Israelits had scarce passed the Red Sea on their way to the wilderness, before the Amalekites came to attack them in the deserts of Raphidin (Ex. xvii. 8.); put to them cruelly to the sword who were obliged, either through fatigue or weakness, to remain behind. Moses, by divine command, directed Joshua to fall upon this people by record the act of humanity which they had committed in a book, in order to have it always before his eyes; and to revenge it in the most remarkable manner. Joshua therefore fell upon the Amalekites, and defeated them while Moses was upon the mountain with Aaron and Hur in company. Moses, during the time of the engagement, held up his hands, to which the success of the battle was owing; for so often as he let them down, Amalek prevailed. But Moses's hands being tired, Aaron and Hur supported his arms, and held them extended, while the battlelasted, which was from morning till the approach of night, when the Amalekites were cut in pieces. This happened in the year of the world 3912, before Chrifi 1491.
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[513]

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The ground of the enmity of the Amalekites against the Israelites is generally supposed to have been an innate hatred from the remembrance of Jacob's depriv- ing their progenitor both of his birthright and bless- ing. Their falling upon them, however, and that without any provocation, when they saw them reduced to so low a condition by the fatigues of their march and the excessive drought they laboured under, was an inhuman action; and justly deserved the defeat which Joshua gave them. Under the Judges (v. 3.), we see the Amalekites united with the Midianites and Moab- ites; in a design to oppress Israel; but Ehud delivered the Israelites from Eglon, king of the Moabites (Judges iii.), and Gideon (chap. vii.) delivered them from the Midianites and Amalekites. About the year of the world 2940, Saul marched against the Amalekites, advanced so far as their capital, and put all the people of the country to the sword; but spared the best of all the cattle and moveables, contrary to a divine command; which act of disobedience was the cause of Saul's future misfortunes.

After this war, the Amalekites scarce appear any more in history. However, about the year of the world 3049, a troop of Amalekites came and pillaged Ziklag, which belonged to David (1 Sam. xxxix.), where he had left his two wives Ahinoam and Abigail; but his returning from an expedition which he had made in the company of Achish into the valley of Jezreel, pursued them, overtook and dispersed them, and recovered all the booty which they had carried off from Zik- lag.

The Arabians maintain Amalek to have been the son of Ham and grandson of Noah; that he was the progenitor both of his nation and his posterity. The Mahometans say that Ad was the father of an ancient tribe called Atit; who were exterminated, as they tell us, for not hearkening to the patriarch Eber, who preached the unity of God to them. Ad had two sons, Schedad and Schedii. Some make him the son of Uz, and grandson of Aram; but the experience of history is against all these traditions.

Amalekites united with the Midianites and Philistines, and never with the Edomites; and when Saul made war upon the Amalekites, and almost utterly destroyed them, we do not find that the Edomites made the least motion towards their assistance, nor to revenge them afterwards. Thence it is thought probable, that the Amalekites who are so often mentioned in Scrip- ture were a free people descended from Canaan, and devoted to the curse as well as the other Amorites, and very different from the descendants of Amalek the grandson of Eglon.

The accounts which the Arabians give us of the Amalekites destroyed by Saul are as follows. Amalek was the father of an ancient tribe in Arabia, exterminated in the reign of Saul. This tribe contained only the Arabians who are called Pure; the remains whereof were mingled with the posterity of Joktan and Adnan, and became Mofarabes or Mofaarabes; that is to say, Arabians blended with foreign nations. They farther believe, that Goliath, who was overcome by David, was king of the Amalekites; and that the giants who inhabited Palestine in Joshua's time were of the same race. That at last part of the Amalekites retired into Africa while Joshua was yet living, and settled upon the coasts of Barbary, along the Mediterranean sea. The sons of Amalek were Ad, a celebrated prince among the Arabians. Some make him the son of Uz, and grandson of Aram; the sons of them. Let this be as it will, the Mahometans say that Ad was the father of an Arabian tribe called Adites; who were exterminated, as they tell us, for not hearkening to the patriarch Eber, who preached the unity of God to them. Ad had two sons, Schedad and Schedii.

AMALFI, an ancient city of Italy, situated in E. Long. 15° 20', Lat. 40° 35'. It is said to have derived its origin from a number of Roman families, who, about the middle of the fourth century, either from private views of emolument, or in consequence of compulsory orders from the emperor, had left Rome and embarked for Constantinople; but meeting with storms on their passage, were cast away on the shores of Salerno, and deprived of the means of pursuing their voyage. In this state of perplexity they long remained, but at last came to the resolution of settling on the present site of Amalfi, where they expected to enjoy security and sufficient plenty of the necessaries of life. The earliest notice of them in this settlement dates no higher than the latter end of the fifth century. Impervious mountains and inaccessible coasts preferred their infant state from the first fury of the Lombards, who seldom attempted the conquest of a maritime people.

In the year 825, when this little republic had, under the patronage of the eastern emperors, attained a degree of wealth and reputation sufficient to excite the ambition of its neighbours, Sico, prince of Salerno, marched a body of troops by night; surprized Amalphi; and, carrying off the greatest part of the inhabitants, compelled them to fix at Salerno, which had lately suffered a great loss of people by an epidemic disorder. But before the fourth year of their captivity was expired, the Amalphins took advantage of the absence of the Salernian chiefs, who were then carrying on a war with the Beneventans; armed themselves; and, after burning and plundering Salerno, marched in triumph back to their own country.

Here they framed a better system of government, and reformed many abuses in their former legislation; adopting various measures that were likely to promote internal concord and defeat the evil intention of foreign enemies. Their first plan was to vest the supreme authority in a temporary prefect; but the experience
of a few years caused them to prefer lodging that
power in the hands of a duke elected for the term of
his natural life. Under these governors Amalfi
attained the summit of her military and commercial glo-
ry. It extended its territory, which reached eastward
from Venice to Cynisca, and westward to the promontory
of Minerva, including likewise the island of Caprea,
and the two islands of the Galli. Towards the north
it comprehended the cities of Lettrea, Gragnanis,
Pimontio, and Capule di Franchi; towards the south,
the of Scala, Ravelli, Minori, Majuri, Atrani, Tra-
monti, Agerula, Citara, Praiano, and Rosiano.
Leo IV. found the Amalians an useful ally in his
wars with the infidels, and honoured the commonwealth
with the title of Defender of the Faith. The Neapol-
tians, with whom, as Greek valets, they were united
in strict bounds of friendship, experienced many sig-
nal favours at their hands; and the Mussulmen them-
theselves found it expedient to court their alliance, and to
enter into treaty with them. Their situation had from
the beginning given them a turn to commerce, and
their attention to naval affairs so much confluence in
the eyes of their protector, the emperor of Constan-
tinople, that by his orders a court was established at
Amalfi for the decision of all controversies arising in
maritime transactions. Its code and reports became the
general rule in those cafes throughout this part of Eu-
rop e; its precedents and decrees were allowed to be
good authority to found judgment upon even in foreign
tribunals. To crown the mercantile and naval glory of
the republic, it was referred to the lot of an Amal-
fi an to make, or at least to perfect, the most impor-
tant discovery ever made for the improvement of navi-
gation. Paifano, a village which stands on the shore
a few miles west of Amalfi, boasted of having given
birth to Flavious Gioia, the inventor of the mariner's
compass.

The merchants of this town engrossed the trade of
the Levant, and transacted the commercial business of
the world in a lucrative and exclusive manner. The
Pisans, Venetians, and Genoese, rose upon their ruin;
and after monopolising the emoluments of trade for
some ages, made way for the more comprehensive and
daring spirit of the present maritime powers.

At present Amalfi is subject to Naples, and is the
see of an archbishop. It is but a shadow of what it
was in its flourishing state, when it extended over the
stupendous rocks that hang on each side, still crowned
with battlemented walls and ruined towers. Its build-
ings, Mr Swinburne says, are not remarkable for elag-
ge or size; and contain at most 4000 inhabitants,
who seem to be in a poor line of life. The cathedral
is an uncoath building. Under the choir is the chas-
pel and tomb of the apostle St Andrew; to whose
honour the edifice was dedicated, when Cardinal
Capuano in 1208 brought his body from Constantin-
ople.

AMALGAM, mercury united with some metal.
AMALGAMATION, the operation of making an
amalgam, or mixing mercury with any metal.

For the combination of one metal with another, it
is generally sufficient that one of them be in a state of
fluidity. Mercury being always fluid, is therefore
capable of amalgamation with other metals without
heat; nevertheless, heat considerably facilitates the
operation.

To amalgamate without heat requires nothing more
than rubbing the two metals together in a mortar 
but the metal to be united with the mercury should be
previously divided into thin plates or grains.

When heat is used (which is always most effectual
and with some metals indispensably necessary), the
mercury should be heated till it begins to fumke, and
the grains of metal made red-hot before they are
thrown into it. If it be gold or silver, it is sufficient to
stir the fluid with an iron rod for a little while, and
then throw it into a vessel filled with water. This
amalgam is used for gilding or silvering on copper,
which is afterwards exposed to a degree of heat suffi-
cient to evaporate the mercury.

Amalgamation with lead or tin is effected by pouring
an equal weight of mercury into either of these
metals in a state of fusion, and stirring with an iron
rod. Copper amalgamates with great difficulty, and
iron not at all.

AMALTHEA, the name of the Cumean Sibyl,
who offered to Tarquin Superbus nine books, con-
taining the Roman defineds, and demanded 300 pieces
of gold for them. He derided her; whereupon
she threw three of them into the fire; and retuming, asked
the same price for the other six; which being denied;
she burnt three more; and returned, still demanding
the same price. Upon which Tarquin consulting the
pontiffs, was advised to buy them. These books were
in such esteem, that two magistrates were created to
consult them upon extraordinary occasions.

AMALTHEA, in pagan mythology, the daughter
of Melitus, king of Crete, and the nurse of Jupiter,
whom she fed with goat's milk and honey. Accord-
ing to others, Amalthea was a goat, which Jupiter,
translated into the sky, with her two kids, and gave
one of her horns to the daughters of Melitus, as a re-
ward for the pains they had taken in attending him.
This horn had the peculiar property of furnishing them
with whatever they wished for; and was thence called
the cornucopia, or horn of plenty.

AMALTHEUS (Jerome, John Baptista, and Cor-
nielle), three celebrated Latin poets of Italy, who flou-
ried in the 16th century. Their compositions were
printed at Amsterdam in 1683. One of the prettiest
pieces in that collection is an epigram on two children,
whose beauty was very extraordinary, though each of
them was deprived of an eye:

- Lumine Acon dextro, capta est-Leonilla sinistro:
  Et poterat forma vincere uterque deos.
- Parve puer, lumen quod habes concede fori;
  Sic tu cæsus Amor, fic erit illa Venus.

AMAMAS (Sixtus), professor of the Hebrew tongue
in the university of Franeker, a man of great learning,
born in Friesland, and had studied under Druñas.
He published a criticism upon the translation of the
Pentateuch; collated the Dutch translation of the Bi-
ble with the original and most accurate translations;
and wrote a commentary on the Vulgate translation of the
historical books of the Old Testament, Job, the Psalms
and Canticles. It is impossible to answer the reasons
whereby he shows the necessity of consulting the origi-

als.
AMAND (Mark-Anthony-Gerard, sieur de St.), a French poet, was born at Roan in Normandy in 1594. In the epistle dedicatory to the third part of his works, he tells us, that his father commanded a squadron of ships in the service of Elizabeth queen of England for two years, and that he was for three years prisoner in the Black Tower at Constantinople. He mentions also, that two brothers of his had been killed in an engagement against the Turks. His own life was spent in a continual succession of travels, which was of no advantage to his fortune. There are miscellaneous poems of this author, the greatest part of which are of thecomic or burlesque, and the amorous kind. Though there are many blemishes in his poems, yet he had the talent of reading them so agreeably a manner, that every one was charmed with them. In 1650, he published "Stances de la grotte de la reine de Pologne," which was printed at Paris in 1656. Mr Broclette says that he wrote also a poem upon the moon, wherein he paid a compliment to the moon it fell into contempt. Amand wrote also a very first-rate piece, intituled "Stances à M. Corneille, fur fon imitation de Jefus Christ," which was printed at Paris in 1653, he printed his "Moife fauve, idyle heroïque." This poem had at first many admirers: Mons. Chapelain called it a speaking picture; but it has since fallen into contempt. Amand wrote also a very devout piece, intituled "Stances à M. Corneille, fur fon imitation de Jefus Christ," which was printed at Paris in 1653. Mr Broclette says that he wrote also a poem upon the moon, wherein he paid a compliment to Lewis XIV. upon his skill in swimming, in which he used often to exercise himself when he was young, in the river Seine; but the king could not bear this poem, and continued from evening till the next morning. — That prince, thinking the name too vulgar, changed it into that of the feast of the gods, in regard each person here represented some deity as it fell to his lot. The queen assumed the name of Amarante; that is, unfading, or immortal. The young nobility, dressed in the habit of nymphs and sibyls, served the gods at the table. At the end of the feast, the queen threw off her habit, which was covered with diamonds, leaving it to be pulled in pieces by the masques; and, in memory of so gallant a feast, founded a military order, called in Sweden Gefchilder, into which all that had been present at the feast were admitted, including 16 lords and as many ladies, besides the queen. Their device was the cypher of Amarante, composed of two A's, the one erect, the other inverted, and interwoven together; the whole inclosed by a laurel crown, with this motto, Dolce nella memoria.

Bulstrode Whitlock, the English ambassador from Cromwell to the court of Sweden, was made a knight of the order of Amarante; on which account it seems to be, that we sometimes find him styled Sir Bulstrode Whitlock.

AMARANTHOIDES, in botany, the trivial name of a species of ilicicenum. See I. LEC. EBRUM.

AMARANTHUS (of a private, and upurative, to wither, because the flower of this plant when cropped does not soon wither), Amarant, of flower: gentle: A genus of the pentandra order, belonging to the monoezia class of plants; and, in the natural method, ranking under the 54th order, Bifclierum. The characters are: The nuc calyx is a five or three leaved perianthium, erec, coloured, and perisepht; There is no corolla: The flavus consist of five or three erec capitil filaments, the length of the calyx: the anther are oblong and verflis: The female calyx the same as the male, and no corolla: The pisfliumus has an ova german; the fllyli are three, short, and stubulated; the filgmina simple and perisepht: The pericarpium is an .
AMARYLLIS, LILY-ASSIMILATE: A genus of the monogynia order, belonging to the hexandria class of plants; and in the natural method ranking under the 9th order, Spatulaceae. The characters are: The calyx is an oblong obutate spatha, emarginated, and withering. The corolla consists of six petals, lanceolate: the stamens consist of fix filabulate stamens; the androsmes oblong, incumbent, and ascending: the pistillum has an oblong deccussate stamens beneath: a filiform style, nearly the length of the stamens, the stigma trifid and slender: The pericarpium is an ovate trilocular capsule, with three valves: The seeds are many.

Principal Species. I. The lutea, or autumnal narcissus. This is usually fold by gardeners, along with colchicums, for autumnal ornaments to gardens. For this purpose it is very proper, as it will keep flowering from the beginning of September to the middle of November, provided the frost is not too severe as to destroy the flowers. Although there is but one flower in each cover, yet there is a succession of flowers from the same root, especially when they are suffered to remain three or four years removed. The flowers seldom rise above three or four inches high. They are shaped somewhat like the flowers of the yellow crocus; the green leaves come up at the same time, like the saffron; and, after the flowers are past, the leaves increase all the winter. The roots are bulbous, and shaped like those of the narkis: so are proper ornaments for such borders as are planted with cyclamen, saffron, autumnal crocus, colchicums, and such low autumnal flowers. 2. The formosifima, or jacobea lily, produces its flowers two or three times in a year, without being regular to any season. The flowers are of a deep red, the under petals very large, and the whole flower stands nodding on one side of the stalk, making a beautiful appearance. The stamens of the flowers are produced from the sides of the bud; so that when the flowers produced on one side are decayed, another stalk arises from the other side of the bud; but there is no more than one flower produced on the same stalk. When the roots are in vigour, flowers will be produced from March to the beginning of September. 3. The farricius, or Guernsey lily, is supposed to have come originally from Japan, but has been many years cultivated in the gardens of Guernsey and Jersey; in both which places they seem to thrive as well as if it was their native country, and from these islands their roots are sent annually to the curious in most parts of Europe. The flowers of this species are admired for the richness of their colour, which is commonly red, though they have no scent. They appear towards the end of September: and, if properly managed, will continue a month in beauty. The roots of these plants do not flower again the succeeding year, as is the case with many other bulbs; but if their bulbs contain two buds in their centre, which is often the case, they frequently flower twice in three years: after which the same individual root does not flower again in several years, but only the offsets from it. 4. The regina, or belladonna lily, is a native of Portugal, where it was formerly cultivated in great plenty; but of late it has been propagated by the Jacobaea lily, so that the roots which have been taken from that country for some time past for the belladonna, have generally proved the Jacobaea lily. This kind, if properly managed, will sometimes put out two or three stems, growing near three...
three feet high, and produce many flowers in each umbel, which make a fine appearance during the month of October. 5. The zeylanica, or Ceylon lily, is a native of the West Indies, and usually flowers in June. Sometimes the same root will flower again in autumn, but the flowers are of no long duration. 6. The orientalis, or lily siccifolium, with leaves shaped like a tongue. This is a native of the Cape of Good Hope. The bulbs of the root are large and almost round; the leaves long, broad, and rounded at their extremities; these spread two ways on the surface of the ground, and do not come up till after the flower-item appears, which is generally in November. After the flowers are past, the leaves increase till spring, and in May they begin to decay; so that from the middle of June to October the roots are entirely delitiate of leaves.

Cultivation. The first fort is very hardy, and will thrive in almost any foil or situation; but will succeed best in a fresh light dry soil, and not too near the dripping of trees, or too near walls. It increases very fast by offsets, by which all the other species are also to be propagated. These roots may be transplanted any time from May to the end of July; after which it will be too late to remove them. The soil ought to be kept in a moderate state all winter, which case it will send forth plenty of offsets, that will produce vigorous plants. The roots of the Guernsey lily are generally brought over in June and July; but the sooner they are taken out of the ground after the leaves decay, the better: for although the roots which are taken up when their flower-items begin to appear, will flower; yet their flowers will not be so large, nor will their roots be near so good after as those which were removed before they sent forth fresh fibres. When these roots come over, they should be planted in pots filled with fresh, light sandy earth, mixed with a little very rotten dung, and placed in a warm situation, observing now and then to refresh the earth with water: but by no means let them have too much wet, for they will not root their roots, especially before they come up. About the middle of September, such of the roots as are strong enough to flower will begin to show the bud of their flower-item; therefore these pots ought to be removed into a situation where they may have the benefit of the sun, and be sheltered from strong winds. When the flowers begin open, the pots should be removed under shelter, to prevent Injury from too much wet. After the flowers are decayed, the green leaves will begin to show forth in length; and, if sheltered from severe cold, will continue growing all winter: but they must have as much free air as possible in mild weather, and are to be covered only, in great rains or frosts. For this purpose, a common hot-bed frame is the most proper shelter for them: the glasses of which may be taken off every day in dry open weather, which will encourage the leaves to grow strong and broad. The roots should be transplanted every fourth or fifth year, toward the end of June or beginning of July; the offsets also should be taken off and planted in pots, where in three years time they will produce flowers. The other species of the amaryllis may easily be raised by taking care to shelter them in a stove from the winter's cold.

AMARYNTHUS (anc. geog.), a hamlet of Eretrias, in the island of Euboea, about seven stadia distant from its walls. Here Diana was worshipped by an annual solemnity, at which those of Carytyas assisted; hence the title of the goddess was Amalthea, and Amayris.

AMASIA (anc. geog.), now Marpurg, a city in the landgrave of Hesse, on the Lahn. According to others, it is Eubon in Westphalia. AMASIA, an ancient town of Turkey, in Natolia, remarkable for the birth of Strabo the geographer. It is the residence of a bailiff, and gives its name to the province it stands in, where there are the best wines and the best fruits in Natolia. It is seated near the river Iris or Cafalmack; and was anciently the residence of the kings of Cappadocia. E. Long. 36° N. Lat. 39° 33'.

AMASIA, the name of the northern division of Leffer Afia, lying on the south shore of the Euxine sea in Natolia. It takes its name from Amasia the capital, mentioned in the preceding article.

AMASONIA, in botany: A genus of the angio-

AMATHUS, a very ancient town in the south of Cyprus (Strabo, Pтолеmy): so called from Amathus the founder; or, according to others from Amath, a Phoenician town sacred to Venus, with a very ancient temple of Adonis and Venus: and hence Venus is denominated Anathusia (Tacitus). According to Ovid, it was a place rich in copper-ore, and where the inhabitants became Herae, or horned. Now called Limifso.

AMATHUS (anc. geog.), a town of the tribe of Gad, beyond Jordan; but whether at a greater or less distance from it, is not so easy to determine. Eufebius places it in the Lower Persea; Roland, in Ramoth-Gilead. Gabinius, proconsul of Syria, established five judicial conventions in Judea; two of which were on the other side Jordan; one at Gadera, the other at Amathus (Josephus).

AMATORII MUSCULI, in anatomy, a term sometime used for the obliquus superior and obliquus inferior muscles of the eye, as these muscles assist in ogling or drawing the eye sideways.

AMATRICE, a city of the kingdom of Naples, in the farther Abruzzo, upon the confines of the pope's territories, and the marquisate of Ancona.

AMAUROSIS, in medicine, a deprivation of sight, the eye remaining fair, and seeming unaffected. A perfect amaurosis is when the blindness is total; when there is still a power of distinguishing light from darkness, the disease is called by M. de St Ives an imperfect amaurosis. There is a periodical fort which comes on instantaneously, continues for hours, or days, and then disappears. Mr Hay, surgeon at Leeds, mentions several cases of patients affected with the amaurosis who were relieved by being electrified.

AMAZONIA, or the country of the American
Amazonia. Amazons, is situat between 50 and 70 degrees of west latitude; and between the equator and 50 degrees of south latitude; being bounded on the south by La Plata, on the west by Peru, on the north by the province of Terra Firme, and on the east by Brazil.

With respect to the Amazons paid to have given name to this territory, they have been represented as governed and led to war only by their queen. No men were suffered to live among them; though those of some neighbouring nations were suffered to visit them, at a certain season, for the sake of procreation. The females issuing from this commerce were bred up with care, and instructed in what relates to war and government; as to the males, they were sent away into the country of their fathers. But no such nation is at present to be found, any more than the giants and cannibals mentioned by the first adventurers thither.

Amazonia is generally a flat region, abounding in woods, lakes, rivers, bogs, and mosquitoes. The chief river, and one of the largest in the world, is that called the river of Amazons, or the Orelliana, which is formed by two large rivers, the one rising in the province of Quito, a little south of the equator, in 73 degrees of well longitude, and the other, named Xauxa, rising in the lake of Bourbon, near the Andes, in ten degrees of south latitude. These two rivers uniting on the confines of Peru and Amazonia, in three degrees odd minutes of south latitude, assume the name of Amazon; whence running eastward upwards of 300 miles, and afterwards inclining to the north, they fall into the Atlantic ocean by 84 channels, which in the rainy season overflow the adjacent country. Besides the two streams mentioned, a multitude of others, both on the north and south side, contribute to the formation of this extraordinary river. As it runs almost across the broadest part of South America, it is computed to be between four and five thousand miles in length, including all its windings. Its channel from Junta de los Rios, about 60 degrees from its head, to the river Maranon, is from one to two leagues broad; it then widens from three to four, and becomes gradually broader as it approaches the ocean. Between the places last mentioned, its depth is from five to ten fathoms; but from Maranon to Rio Negro it increases to 20 fathoms; after which it is sometimes 30, and some times 50 fathoms, or more, till it comes near to the end of its course. It has no sand-banks, nor does the shore ever lo as to render it dangerous for vessels.

The manatu and tortoise abound both upon the banks of this and the other rivers; and the fishermen must be upon their guard against the crocodiles, alligators, and water serpents, which also swarm here.

The air, as in the countries under the same parallel, is observed to be nearly as cool under the equator as the air in the tropics, on account of the rains continuing longer, and the sky in that season being clouded. Besides, an-easterly wind sets from the Atlantic up the river so strong, that vessels are carried by it against the stream.

The produce of the country is Indian corn and the cassava root, of which they make flour and bread; tobacco, cotton, sugar, farfaparilla, yams, potatoes, and other roots. They have also plenty of venison, fish, and fowl. Among the latter are vast flocks of parrots of all colours, the flesh of which serves for food and the feathers for ornament. All the trees here are evergreens; and fruits, flowers, and herbs, are in perfection all the year round. The principal fruits are cocoa-nuts, ananas or pine-apples, guavas, bananas, and fuch others as are usually found between the tropics. The forest and timber trees are cedar, Brazil wood, oak, ebony, logwood, iron-wood, so called from its weight and hardnefs, and several sorts of dyeing wood.

The natives are of the common stature, with good features, a copper complexion, black eyes and hair. It is computed that there are of them about 150 different tribes or nations, and the villages are so numerous as to be within call of one another. Among these the Homagues, a people near the head of the river, are famous for their cotton manufactures; the Juries, who live between five and ten degrees of latitude, for their joiners' work, and the Wroffaires for their earthware. The Topinambes, who inhabit a large island in the river, are remarkable for their strength. Some of these nations frequently make war upon each other. Their armour consists of darts, javelins, bows and arrows, and they wear targets of cane, or fish-skin. They make shields of their prisoners, whom they otherwise use very well. Every tribe is governed by its respective chief or king, the marks of whose dignity are a crown of parrots' feathers, a chain of lions' teeth or claws hung round his neck, or girt about his waist, and a wooden sword, which he carries in his hand.

Most of these nations, except the Homagues, go naked. The men thrust pieces of cane through their ears and under lips, as well as through the skin of the pudenda. At the gristle of their noses they also hang glass beads, which hang to and fro when they speak. They are such skilful marksmen, that they will shoot five as they swim; and what they catch, they eat without bread or salt. They worship images, which they always carry with them on their expeditions; but they neither have temples nor any order of priests; and permit both polygamy and concubinage.

The country affords neither gold nor silver mines; only a small quantity of the former is found in the rivulets which fall into the Amazon near its sources in Peru. While the Spaniards imagined that it contained those metals, they made great efforts from Peru to reduce this territory to subjection; till being at length undeceived, they abandoned the design. Amazonia, in antiquity, a nation of female warriors, who founded an empire in Asia Minor, upon the river Thermodon, along the coasts of the Black Sea. They are said to have formed a state out of which men were excluded. What commerce they had with that sex, was only with strangers; they killed all their male children; and they cut off the right breast of their females, to make them more fit for the combat. From which last circumstance it is, that they are supposed to take their name, viz., from the primitive, man, mamma, mamma, "breast." But Dr Bryant, in his Analysis of ancient mythology, explains this account as fabulous; and observes, that they were in general Cuthite colonies from Egypt and Syria, who formed settlements in different countries, and that they derived their name from xon, the "fun," which was the national object of worship. Vol. iii. p. 493. — It has indeed
Amazons

Amazons have been controverted even among ancient writers, whether ever there really were such a nation as that of the Amazons. Strabo, Pausanias, and others, deny it. On the contrary, Herodotus, Polybius, Dio- dorus Siculus, Trogus Pompeius, Justin, Pliny, Mela, Plutarch, &c., expressly affirm it.

M. Petit, a French physician, published a Latin dissertation in 1685, to prove that there was really a nation of Amazons; it contains abundance of curious inquiries, relating to their habit, their arms, the cities built by them, &c. Others of the moderns also maintain, that their existence is sufficiently proved by the testimony of such of the historians of antiquity as are most worthy of credit; by the monuments which many of them have mentioned; and by medals, some of which are still remaining; and that there is not the least reason to believe that what is said of them is fabulous.

The Amazons are mentioned by the most ancient of the Greek writers. In the third book of the Iliad, Homer represents Priam speaking of himself as having been young, in the earlier part of his life, in a battle with the Amazons: and some of them afterwards came to the siege of Troy. The Amazons are particularly mentioned by Herodotus. That historian informs us, that the Greeks fought a battle with the Amazons on the river Thermodoon, and defended them. After their victory, they carried off all the Amazons they could take alive, in three ships. But whilst they were out at sea, these Amazons confpired against the men, and killed them all. Having, however, no knowledge of navigation, nor any skill in the use of the rudder, sails, or oars, they were driven by wind and tide till they arrived at the precipices of the lake Mazoia, in the territories of the Scythians. Here the Amazons went ashore, and marching into the country, seized and mounted the first horses they met with, and began to plunder the inhabitants. The Scythians at first conceived them to be men; but after they had had skirmishes with them, and taken some prisoners, they discovered them to be women. They were then unwilling to carry on hostilities against them; and by degrees a number of the young Scythians formed connections with them, and were desirous that these gentle dames should live with them as wives, and be incorporated with the rest of the Scythians. The Amazons agreed to continue their connection with the Scythian husbands, but refused to associate with the rest of the inhabitants of the country, and especially with the women of it. They afterwards prevailed upon their husbands to retire to Sarmatia, where they settled. "Hence," says Herodotus, "the wives of the Sarmatians still continue their ancient way of living. They hunt on horseback in the company of their husbands, and sometimes alone. They march with their armies, and wear the same dress with the men. The Sarmatians use the Scythian language, but corrupted from the begining, because the Amazons never learned to speak correctly. Their marriages are attended with this circumstance: no virgin is permitted to marry till she has killed an enemy in the field; so that some always grow old before they can qualify themselves as the law requires."

Diodorus Siculus says, "There was formerly a nation who dwelt near the river Thermodoon, which was subjected to the government of women, and in which the women, like men, managed all the military affairs. Among these female warriors, it is said, was one who excelled the rest in strength and valour. She assembled together an army of women, whom she trained in military discipline, and subdued some of the neighbouring nations. Afterwards, having by her valour increased their fame, she led her army against the rest; and being successful, she was so exulted, that she flew herself the daughter of Mars, and ordered the men to spin wool, and do the work of the women within doors. She also made laws, by which the women were enjoined to go to the wars, and the men to be kept at home in a servile state, and employed in the meanest offices. They also debilitated the arms and limbs of those male children who were born to them, that they might be thereby rendered unfit for war. They feared the right breasts of their girls, that they might be no hindrance to them in fighting: from whence they derived the name of Amazons. Their queen, having become extremely eminent for skill and knowledge in military affairs, at length built a large city at the mouth of the river Thermodoon, and adorned it with a magnificent palace. In her enterprise she exactly adhered to military discipline and good order; and she added to her empire all the adjoining nations, even to the river Tanais. Having performed these exploits, she at last ended her days like a hero, falling in a battle, in which she had fought courageously. She was succeeded in the kingdom by her daughter, who imitated the valour of her mother, and in some exploits excelled her. She cauited the girls from their very infancy to be exercised in hunting, and to be daily trained in military exercises. She instituted solemn festivals and sacrifices to Mars and Diana, which were named Tauropoli. She afterwards carried her arms beyond the river Tanais, and subdued all the people of those regions even unto Thrace. Returning then with a great quantity of spoil into her own kingdom, she caused magnificent temples to be erected to the deities before mentioned; and she gained the love of her subjects by her mild and gentle government. She afterwards undertook an expedition against those who were on the other side of the river, and subjected to her dominion a great part of Asia, extending her arms as far as Syria."

Diodorus also mentions another race of Amazons who dwelt in Africa; and whom he speaks of as being of greater antiquity than those who lived near the river Thermodoon. "In the western parts of Libya," says he, "upon the borders of those tribes that are habitable, there was an ancient nation under the government of women, and whose manners and mode of living were altogether different from ours. It was the custom for these women to manage all military affairs; and for a certain time, during which they preferred their virginity, they went out as soldiers in the field. After some years employed in this manner, when the time appointed for this purpose was expired, they associated themselves with men, in order to obtain children. But the magistracy, and all public offices, they kept entirely in their own hands. The men, as the women are with us, were employed in household affairs, submitting themselves wholly to the authority of their wives. They were not permitted to take any part in military
military affairs, or to have any command, or any public authority, which might have a tendency to encourage them to cast off the yoke of their wives. As soon as any child was born, it was delivered to the father, to be fed with milk or such other food as was suitable to its age. If females were born, they feared their breasts, that they might not be burdened to them when they grew up; for they considered them as great hindrances in fighting."

Justinian represents the Amazonian republic to have taken its rise in Scythia. The Scythians had a great part of Asia under their dominion upwards of 400 years, till they were conquered by Ninus, the founder of the Assyrian empire. After his death, which happened about 150 years before the Christian era, and that of Semiramis and their son Ninias, Lulus and Scelopites, princes of the royal blood of Scythia, were driven from their country by other princes, who like them aspire to the crown. They departed with their wives, children, and friends, and being followed by a great number of young people of both sexes, they pulled into Asiatic Sarmatia, beyond mount Camalus, where they formed an establishment, supplying themselves with the riches they wanted, by making excursions into the countries bordering on the Euxine Sea. The people of those countries, either from the incursions of their new neighbours, united, surprised, and massacred the men.

The women then resolving to revenge their death, and at the same time to provide for their own security, resolved to form a new kind of government, to choose a queen, enact laws, and maintain themselves, without men, even against the men themselves. This design was not so very surprizing as at first sight appears: for the greatest number of the girls among the Scythians had been injured to the same exercises as the boys; to draw the bow, to throw the javelin, to manage other arms; to riding, hunting, and even the painful labours which they now considered as an infupportable slavery. As soon as the girls permitted, they took away the right breast, that they might draw the bow with the greater force. The common opinion is, that they burnt that breast, by applying to it, at eight years of age, a hot brazen instrument, which indefatigably dried up the fibres and glands: some think that they did not make use of so much ceremony, but that when the part was formed they got rid of it by amputation: some, again, with much greater probability, affert, that they employed no violent measures; but, by a continual compulsion of that part from infancy, prevented its growth, at least so far as to hinder its ever being inconvenient in war.

Plutarch, treating of the Amazons in his life of Theseus, considers the accounts which had been preserved concerning them as partly fabulous and partly true. He gives some account of a battle which had been fought between the Athenians and the Amazons at Athens; and he relates some particulars of this battle, which had been recorded by an ancient writer named Cidemus. He says, "That the left wing of the Amazons moved towards the place which is yet called Amazonium, and the right to a place called Pryxa, near Chrysa; upon which the Athenians, infuing from behind the temple of the muses, fell upon them; and that this is true, the graves of those who were slain, to be seen in the streets that lead to the gate Piraeus, by the temple of the hero Chaleodis, are sufficient proof. And here it was that the Athenians were routed, and shamefully turned their backs to women, as far as to the temple of the Furies. But fresh supplies coming in from Palladium, Ardetus, and Lyceum, charged their right wing, and beat them back into their very tents; in which action a great number of the Amazons were slain." In another place he says, "It appears that the passage of the Amazons through Thessaly was not without opposition; for there are yet to be seen many of their sepulchres nearScotus and Cynephale." And in his life of Pompey, speaking of the
The Amazons, Plutarch says, "They inhabit those parts of mount Caucasus that look towards the Hyrcanian sea (not bordering upon the Albanians, for the territories of the Goths and the Leges lie betwixt): and with these people do they yearly, for two months only, accompany and cohabit, bed and board, near the river Thermodoon. After that they retire to their own habitations, and live alone all the rest of the year."

Quintus Curtius says, "The nation of the Amazons is situated upon the borders of Hyrcania, inhabiting the plains of Hermicyra, near the river 1 thermodoon. Their queen was named Thalestris; and she had under her subjection all the country that lies between mount Caucasus and the river Phasis. This queen came out of her dominions, in conformance of an ardent desire she had conceived to see Alexander; and being advanced near the place where he was, she previously sent messengers to acquaint him, that the queen was come to have the satisfaction of seeing and conversing with him.

Having obtained permission to visit him, she advanced with 300 of her Amazons, leaving the rest of her troops behind. As soon as she came within sight of the king, she leaped from her horse, holding two javelins in her right hand. The apparel of the Amazons does not cover all the body, for their left side is naked down to the stomack, nor does the skirts of their garments, which they tie up in a knot, reach below their knees. They prefer their left breast entire, that they may be able to fuckle their female offspring; and they cut off and fear their right, that they may draw their bows, and cast their darts, with the greater ease. Thalestris looked at the king with an undaunted countenance, and narrowly examined his person; which did not, according to her ideas, come up to the fame of his great exploits: For the barbarians have a great veneration for a majestic person, deeming those only to be capable of performing great actions, on whom nature has conferred a dignified appearance. The king having asked her whether she had any thing to desire of him, she replied, without scruple or hesitation, that she was come with a view to have children by him, the being worthy to bring him heirs to his dominions. Their offspring, if of the female sex, she would retain herself; and if of the male sex, it should be delivered to Alexander. He then asked her, whether she would accompany him in his wars? But this she declined, alleging, that she had left nobody to take care of her kingdom. She continued to solicit Alexander, that he would not send her back without conforming to her wishes; but it was not till after a delay of 13 days that he complied. She then returned to her own kingdom.

Justin also repeatedly mentions this visit of Thalestris to Alexander; and in one place he says, that she made a march of 25 days, in order to obtain this meeting with him. The interview between Alexander and Thalestris is likewise mentioned by Diodorus Siculus. The learned Goropius, as he is quoted by Dr Petit, laments, in very pathetic terms, the hard fate of Thalestris, who was obliged to travel so many miles, and to encounter many hardships, in order to procure this interview with the Macedonian prince, and, from the circumstances, is led to consider her action as incredible. But Dr Petit, with equal erudition, with equal eloquence, and with superior force of reasoning, at length determines, that her journey was not founded upon irrational principles, and that full credit is due to those grave and venerable historians by whom this transaction has been recorded.

The Amazons are represented as being armed with bows and arrows, with javelins, and also with an axe of a particular construction, which was denominated the axe of the Amazons. According to the elder authors, this axe was invented by Penthesilea, one of their queens. On many ancient medals are representations of the Amazons, armed with these axes. They are also said to have had backlers in the shape of a half-moon.

The Amazons are mentioned by many other ancient authors besides those which have been enumerated; and if any credit be due to the accounts concerning them, they subsisted through several ages. They are represented as having rendered themselves extremely formidable; as having founded cities, enlarged the boundaries of their dominions, and conquered several other nations.

That at any period there should have been women, who, without the assistance of men, built cities and governed them and called and administered public affairs, and extended their dominion by arms, is undoubtedly contrary to all that we have seen and known of human affairs, as to appear in a very great degree incredible; but that women may have excelled sufficiently robust and sufficiently courageous to have engaged in warlike enterprises, and even to have been successful in them, is certainly not impossible, however contrary to the usual course of things. In support of this idea of the question, it may be urged, that women who have been early trained to warlike exercises, to hunting, and to an hard and laborious mode of living, may be rendered more strong, and capable of more vigorous exertions, than men who have led indolent, delicate, luxurious lives, and who have seldom been exposed even to the inclemencies of the weather. The limbs of women, as well as of men, are strengthened and rendered more robust by frequent and laborious exercises. A nation of women, therefore, brought up and disciplined as the ancient Amazons are represented to have been, would be superior to an equal number of effeminate men; though they might be much inferior to an equal number of hardy men trained up and disciplined in the same manner.

That much of what is said of the Amazons is fabulous, there can be no reasonable doubt; but it does not therefore follow, that the whole is without foundation. The ancient medals and monuments on which they are represented are very numerous, as are also the testimonies of ancient writers. It seems not rational to suppose that all this originated in fiction, though it may be much blended with it. The Abbe Guyon speaks of the history of the Amazons as having been regarded by many persons as fabulous, "rather from prejudice than from any real and solid examination;" and it must be acknowledged, that the arguments in favor of their existence, from ancient history, and from ancient monuments, are extremely powerful. The fact seems to be, that truth and fiction have been blended in the narrations concerning these ancient heroines. A character of heroism in women have occasionally occurred in modern times, figures resembling that of the ancient Amazons. The times and the manners of chivalry in particular, by bringing great enterprizes,
bold adventures, and extravagant heroism, into fashion, inspired the women with the same taste. The women, in consequence of the prevailing passion, were now seen in the middle of camps and of armies. They quitted the soft and tender inclinations, and the delicate offices of their own sex, for the toils and the toilsome occupation of ours. During the crusades, animated by the double enthusiasm of religion and of valor, they often performed the most romantic exploits; obtained indulgences on the field of battle, and died with arms in their hands, by the side of their lovers or of their husbands.

In Europe, the women attacked and defended fortifications; princesses commanded their armies, and obtained victories. Such was the celebrated Joan de Montfort, disputing for her duchy of Brestagne, and fighting in person. Such was that still more celebrated Margaret of Anjou, active and intrepid general and soldier, whose genius supported a long time a feeble husband; which taught him to conquer; which replaced him upon the throne; which twice relieved him from prison; and, oppressed by fortune and by rebels, which did not bend till after she had decided in person twelve battles.

The warlike spirit among the women, confinset with ages of barbarism, when every thing is impetuous but nothing is fixed, and when all excess is the excess of force, continued in Europe upwards of 400 years, showing itself from time to time, and always in the middle of convulsions or on the eve of great revolutions. But there were eras and countries in which that spirit appeared with particular lustre. Such were the displays it made in the 15th and 16th centuries in Hungary, and in the ilands of the Archipelago and the Mediterranean when they were invaded by the Turks.

Among the striking instances of Amazonian conduct in modern ladies, may be mentioned that of Jane of Belleville, widow of Monf. de Clifton, who was beheaded at Paris in the year 1443, on a suspicion of carrying on a correspondence with England and the Count de Montfort... This lady, filled with grief for him to modern manners, and exhibited among the female inhabitants of that province were spectators more than once, whilst their villages were all in a blaze, of one of the finest women in Europe, with a sword in one hand and a torch in the other, urging the carnage, and saying with pleasure all the horrors of war.

We read in Mazarin, under the article of the Croisade, preached by St Bernard in the year 1147, "That many women did not content themselves with taking the crofs, but that they also took up arms to defend it, and composed squadrons of females, which rendered credible all that has been said of the prowess of the Amazons."

In the year 1509, the League party obtained some troops from the king of Spain. Upon the news of their being disembarked, Barri de St Aunez, Henry IV.'s governor at Leucate, set out to communicate a scheme to the Duke de Montmorency, commander in that province. He was taken on his way by some of the troops of the League, who were also upon a march with the Spaniards towards Leucate. They were persuaded, that by thus having the governor in their hands the gates of that place would be immediately opened to them, or at least would not hold out long. But Contiantina de Ceceli, his wife, after having assembled the garrison, put herself to rout at their head, pike in hand, that she inspired the weakest with courage; and the besiegers were repulsed wherever they presented themselves. Shame and their great loss having rendered them desperate, they sent a message to this courageous woman, acquainting her, that if she continued to defend herself they would hang her husband. She replied with tears in her eyes, "I have riches in abundance: I have offered them, and I do still offer them, for his ransom; but I would not ignominiously purchase a life which he would reproach me with, and which he would be ashamed to enjoy. I will not disillusion him by treason against my king and country." The besiegers having made a fresh attack without success, put her husband to death, and raised the siege. Henry IV. afterwards sent to this lady the bouquet of governess of Leucate, with the reversion for her son.

The famous Maid of Orleans, also is an example known to every reader.

The Abbé Arnaud, in his Memoirs, speaks of a Countess of St Balmont, who used to take the field with her husband and fight by his side. She sent several Spanish prisoners of her taking to Marshal Fenquisers; and what is not a little extraordinary, this Amazon at home was all affability and sweetness, and gave herself up to reading and acts of piety.

Dr Johnson seems to have given some credit to the accounts which have been transmitted down to us concerning the ancient Amazons; and he has endeavoured to shew, that we ought not hastily to reject ancient historical narrations because they contain facts repugnant to modern manners, and exhibit scenes to which nothing now occurring bears a resemblance. "Of what we know not (says he), we can only judge by what we know. Every novelty appears more wonderful as it is more remote from any thing with which experience or testimony have hitherto acquainted us; and if it passes farther, beyond the notions that we have been accustomed to form, it becomes at last incredible. We seldom consider, that human knowledge is very narrow; that national manners are formed by chance; that uncommon conjunctures of causes produce rare effects; or that what is impossible at one time or place may yet happen in another. It is always easier to deny than to enquire. To refuse credit confers for a moment an appearance of superiority which every little mind is tempted to assume, when it may be gained far cheaper as by withdrawing attention from evidence, and declining the fatigue of comparing probabilities. Many relations of travellers have been slighted as fabulous, till more frequent voyages have confirmed their veracity; and it may reasonably be imagined, that many ancient historians are unjustly suspected of falsehood, because our own times afford no instance of the fables which they tell. Yet many narratives will either to men or women appear more incredible than the histories of the Amazons; of female nations, of whose con-
AMBACHT, in topography, denotes a kind of jurisdiction or territory, the polis or of the administration of justice both in alto and bajof; or of what is called in the Scots law a power of pit and gallows, i.e. a power of drowning and hanging. In some ancient writers, ambacht is particularly used for the administration, government, or chief magistracy of a city. The word is very ancient, though used originally in a sense somewhat different. Ennius calls a mercenary, or flave hired for money ambactus; and Cæsar gives the same appellation to a kind of dependents among the Gauls, who, without being slaves, were attached to the service of great lords.

AMBAGES. See Circumlocution.

AMBARVALIA, in antiquity, a ceremony among the Romans, when, in order to procure from the gods an happy harvest, they conducted the victims thrice round the corn fields in procession, before sacrificing them.—Ambarvalia were either of a private or public nature; the private were performed by the master of a family; and the public by the priests who officiated at the solemnity, called fraterseculares. The prayer preferred on this occasion, the formula of which we have in Cat. de Rel. Rustica, cap. xlvii, was called cornem ambarevala. At these feasts they sacrificed to Ceres a sow, a sheep, and a bull or heifer, whom they took the name of foc Jensauridae. The method of celebrating them was, to lead a victim round the fields, while the chief priest accompanied it, and one of their number, crowned with oak, hymned forth the praises of Ceres, in verses composed on purpose. This festival was celebrated twice a year; at the end of January, according to some, or in April, according to others; and for the second time, in the month of July.

AMBASSADOR, or Embassador, a public minister sent from one sovereign prince, as a representative of his person to another.

Ambassadors are either ordinary or extraordinary. Ambassadors in ordinary, is he who constandy resides in the court of another prince, to maintain a good understanding, and look to the interest of his master. Till about two hundred years ago, ambassadors in ordinary were not heard of; all, till then, were ambassadors extraordinary; that is, such as are sent on some extraordinary occasion, and who retire as soon as the affair is dispatched.

By the law of nations, none under the quality of a sovereign prince can send or receive an ambassador. At Athens, ambassadors mounted the pulpit of the public orators,
And where he resides, as long as he shall continue there; and if he refuses, then letters of relieve are to go from the king's or state's leave where he resides, as some conceive; for all actions ought to be far from an ambassador, as well as that which touches his necessaries, as his person; if, therefore, he hath contrived any debt, he is to be called upon kindly; and if he refuses, then letters of request are to go to his master. Nor can any of the ambassador's domicile servants that are registered in the secretaries of state's office be arrested in person or goods; if they are, the process shall be void, and the parties facing out and executing it shall suffer and be liable to such penalties and corporal punishment as the lord chancellor or either of the chief justices shall think fit to inflict. Yet ambassadors cannot be defended when they commit any thing against that state, or the person of the prince, with whom they reside; and if they are guilty of treason, felony, &c. or any other crime against the law of nations, they lose the privilege of an ambassador, and may be subject to punishment as private aliens.

Ambassadors should never attend any public solemnities, as marriages, funerals, &c. unless their masters have some interest therein; nor must they go into mourning on any occasions of their own, because they represent the person of their prince. By the civil law, the movable goods of an ambassador, which are accounted an accession to his person, cannot be seized on, neither as a pledge, nor for payment of a debt, nor by order, or execution of judgment, nor by the king's or state's leave where he resides, as some conceive; for all actions ought to be far from an ambassador, as well as that which touches his necessaries, as his person: if, therefore, he hath contrived any debt, he is to be called upon kindly; and if he refuses, then letters of request are to go to his master. Nor can any of the ambassador's domicile servants that are registered in the secretaries of state's office be arrested in person or goods; if they are, the process shall be void, and the parties facing out and executing it shall suffer and be liable to such penalties and corporal punishment as the lord chancellor or either of the chief justices shall think fit to inflict. Yet ambassadors cannot be defended when they commit any thing against that state, or the person of the prince, with whom they reside; and if they are guilty of treason, felony, &c. or any other crime against the law of nations, they lose the privilege of an ambassador, and may be subject to punishment as private aliens.

AMB in surgery, the name of an instrument for reducing dislocated bones. In entomology, a term for the superficial jutting out of a bone.

AMB (Succedaneum), in natural history, a solid, hard, fennile, bituminous substance of a particular nature, of use in medicine and in several of the arts. It has been called amber by the Arabsians, and amber by the Greeks.

Ambassadors have been of great repute in the world from early times. Many years before Christ, it was in effect as a medicine; and Plato, Aristotle, Herodotus, Archelaus, and others, have commended its virtues. In the times of the Romans it became in high esteem as a gem; and in the luxurious reign of Nero, immense quantities of it were brought to Rome, and used for ornamenting works of various kinds.

The most remarkable property of this substance is, that, when rubbed, it draws or attract other bodies to it: and this, it is observed, does, even to those substances which the ancients thought it had an antipathy to, as oily bodies, drops of water, human sweat, &c. Add, that by the friction is brought to yield light pretty copiously in the dark; whence it is reckoned among the native phosphors.

The property which amber possesses of attracting light bodies, was very anciently observed. Thales of Mileus, 600 years before Christ, concluded from hence that it was animated. But the first person who expressly mentions this substance, is Theophrastus, about the year 300 before Christ. The attractive property of amber is likewise occasionally taken notice of by Pliny, and other later naturalists, particularly by Gaffendor, Kenelm Digby, and Sir Thomas Brown; but it was generally apprehended that this quality was peculiar to amber and jet, and perhaps agate, till Gilbert published his treatise De Magnete, in the year 1600. From amber, the Greek name for amber, is derived the term Electricity, which is now very extensively applied not only to the power of attracting light bodies, inherent in amber, but to other similar powers, and their various effects, in whatever bodies they reside, or to whatever bodies they may be communicated.

Amber assumes all figures in the ground; that of a pear, an almond, a pea, &c. In amber there have been found to be letters found very well formed; and even Hebrew and Arabic characters. Within some pieces, leaves, insects, &c. have likewise been found included; which seems to indicate, either that the amber was originally in a fluid state, or that having been exposed to the sun, it was once softened, and rendered susceptible of the leaves, insects, &c. which came in its way. The latter of these suppositions seems the more agreeable to the phenomenon, because these insects, &c. are never found in the centre of the pieces of amber, but always near the surface. It is observed by the inhabitants of those places where amber is produced, that all animals, whether terrestrial, aerial, or aquatic, are extremely fond of it, and that pieces of it are frequently found in their excrements. The bodies of insects, found buried in amber, are viewed with admiration by all the world; but of the most remarkable of these, many are to be suspected as counterfeit, the great price at which beautiful specimens of this kind fell, having tempted ingenious cheats to introduce artificial bodies in such artful manners into seemingly whole pieces of amber, that it is not easy to detect the fraud.

Of those insects which have been originally included in amber, some are plainly seen to have struggled hard for their liberty, and even to have left their limbs behind them in the attempt; it being no unusual thing to see, in a mass of amber that contains a stout beetle, the animal wanting one, or perhaps two of its legs; and those legs left in different places, nearer that part of the mass from which it has travelled. This also may account for the common accident of finding legs or wings of flies, without the rest of their bodies, in pieces of amber; the insects having, when entangled in the yet soft and viscous mass, escaped, at the expense of leaving those limbs behind them. Drops of clear water are sometimes also preferred in amber. These have doubtless been received into while soft, and preserved by its hardening round them. Beautiful leaves of a pinnated structure, resembling some of the ferns, or maidenhair, have been found in some pieces; but these are rare, and specimens of great value. Mineral substances are also found at times lodged in masses of amber. Some of the pompos collections of the German princes boast of specimens of native gold and silver in masses of amber; but as there are many substances of the marcasite, and other kinds, that have all the glittering appearance of gold and silver, it is not to be too hastily concluded that these metals are really lodged in these beds of amber. Iron is found in various shapes imbedded in amber; and as it is often seen corroded, and sometimes in the state of vireo, it is not improbable but that copper, and the other metals, may be also sometimes imbedded in it in the same state; hence the bluish and greenish colours, frequently found in the recent pieces of amber, may be owing, like the particles.
particles of the gem colours, to those metals; but as the gems, by their dense texture, always retain their colours, this lighter and more lax bitumen usually loses what it gets of this kind, by keeping some time. Small pebbles, grains of sand, and fragments of other stones, are not unfrequently also found immersed in amber.

Naturalists have been greatly divided as to the origin of this sub stance, and what clods of substances it belongs to; some referring it to the vegetable, others to the mineral, and some even to the animal kingdom. Pliny describes it as a "refraneous juice, oozing from aged plumes and firs (others say from poplars, where there are whole forests on the coasts of Sweden), and discharged thence into the sea, where, under going some alteration, it is thrown, in this form, upon the shores of Prussia, which lie very low: he adds, that it was hence the ancients gave it the denomination *fucus maris; from fucus, juice."

Some suppose amber a compound substance. Prussia, they say, and other countries which produce amber, are moistened with a bituminous juice, which mixing with the vitriolic farts abounding in those places, the points of those farts fix its fluidity, whence it commingles; and the refult of that conglutination makes what we call amber; which is more or less pure, transparent, and firm, as thofe parts of falt and bitumen are more or less pure, and are mixed in this or that proportion.

Mr. Brydone, in his tour to Sicily and Malta, says, that the river Gareta, formerly celebrated by the poets under the name of Simetus, throws up near its mouth great quantities of amber. He mentions also a kind of artificial amber, not uncommon there, made, as he was told, from coals, but very different from the natural.

According to Hartman, amber is formed of a bitumen, mixed with vitriol and other farts. But though this were allowed him in regard to the fossil amber, many dispute whether the sea-amber be so produced. It is, however, apparent, that all amber is of the same origin, and probably that which is found in the sea has been wafted thither out of the cliffs; though Hartman thinks it very probable, that fome of it may have been formed in the earth under the sea, and be wafted up thence. The sea-amber is usually finer to the eye than the fossil, but the reafon is, that it is divifed of that coarse coat with which the other is covered while in the earth.

Upon the whole, it seems generally agreed upon, that amber is a true bitumen of fossil origin.—In a late volume of the *Journal de Physique,* however, we find it afferted by Dr. Gitanner to be an animal product, a fort of honey or wax formed by a species of large ant called *Linnæus formica rufa.* These ants, our author informs us, inhabit the old pine forests, where they sometimes form hills about fix feet in diameter; and it is generally in these ancient forests, or in places where they have been, that foille amber is found. This substance is not hard as that which is taken up in the sea at Prussia, and which is well known to naturalists. It has the confistency of honey or of half melted wax, but it is of a yellow colour like common amber; it gives the same product by chemical analysis, and it hardens like the other when it is suffered to remain some time in a solution of common salt. This accounts for the insects that are so often found imbedded in it. Among these insects ants are always the moft prevailing: which tends farther, Mr. Gitanner thinks, to the confirmation of his hypothesis. Amber then, in his opinion, is nothing but a vegetable oil rendered concrete by the acid of ants, just as wax is nothing but an oil hardened by the acid of bees; a fact incontrovertibly proved, we are told, since Mr. Metheric has been able to make artificial wax by mixing oil of olives with the nitrous acid, and which wax is not to be distinguished from the natural.

There are several indications which discover where amber is to be found. The surface of the earth is there covered with a soft gray flene; and vitriol in particular always abounds there, which is sometimes found white, sometimes reduced into a matter, like melted gips, and sometimes figured like petrified wood.

Amber of the finest kind has been found in England. It is frequently thrown on the shores of Yorkshire, and many other places, and found even in the clay-pits; the pits dog for tile-clay, between Tyburn and Kentington gravel-pits, and that behind St. George's Hospital at Hyde park corner, have afforded fine specimens. In Poland, Silezia, and Bohemia, are famous for the amber dug up there at this time. Germany affords great quantities of amber, as well dug up from the bowels of the earth, as taffed about on the shores of the sea and rivers there. Saxony, Mifnia, and Sweden, and many other places in this tract of Europe, abound with it. Denmark has afforded, at different times, several quantities of fossil amber; and the shores of the Baltic abound with it. But the countries lying on the Baltic afford it in the greatest abundance of all; and of these the most plentiful country is Prussia, and the next is Pomerania. Prussia was, as early as the times of Theodoric the Goth, famous for amber. For this substance coming into great repute with that prince, some natives of Prussia, who were about his court, offered their service to go to their own country, where that substance, they said, was produced, and bring back great stores of it. They accordingly did so; and from this time Prussia had the honour to be called the Country of Amber, instead of Italy, which had before undeservedly that title. This article alone brings his Prussian Majesty a revenue of 26,000 dollars annually. The amber of Prussia is not only found on the sea-coast, but in digging; and though that of Pomerania is generally brought from the shores, yet people who dig, on different occasions, in the very heart of the country, at times find amber.

Junker describes, after Neumann, the Prussian amber-mines, which are the richest known.—First, at the surface of the earth, is found a stratum of sand. Immediately under this sand is a bed of clay, filled with small flakes of about an inch diameter each. Under this clay lies a stratum of black earth, or turf, filled with fossil wood, half decomposed, and bituminous; this stratum is extended upon a bank of minerals, containing little metal, except iron, which are conseqently pyrites. Lastly, under this bed the amber is found, scattered about in pieces, or sometimes accumulated in heaps.

Amber has a subacid resinosous taste, and fragrant aromatic smell, especially when dissolved. It differs from the other bituminous substances in this, that it yields by distillation a volatile acid salt, which none of the others do; otherwise it affords the same sort of principles.
AMB

principles as them, viz. an acid phlegm, an oil which gradually becomes thicker as the distillation is con-
tinued: and when the operation is finished, there re-
 mains a black caput mortuum in the retort.—When
boiled in water, it neither softens, nor undergoes any
sensible alteration. Exposed to the fire in an open
vessel, it melts into a black mass very like a bitumen:
It is partly soluble in spirit of wine, and likewise in
every essential oil; but it is with difficulty that the
exuded ones are brought to act upon it; the stronger
forms of fixed alkaline lixivia almost totally dif-
olve it.

This substance is principally of two colours, white
and yellow. The white is the most esteemed for me-
dicinal purposes, as being the most odoriferous, and
containing the greatest quantity of volatile falt; tho'
the yellow is most valued by those who manufacture
beads and other toys with it, by reason of its tran-
parency.

Amber is the basis of all varnishes, 'by solution'
in the ways described under the article VARNISH.

Amber, when it has once been melted, irrecover-
ably loses its beauty and hardnefs. There have been
some, however, who pretend they had an art of melt-
ing some small pieces of amber into a mass, and
constituting large ones of them: but this seems fuch
another undertaking as the making of gold: all the tri-
als that have yet been made by the most curious expe-
rimenterf, proving, that the heat which is neces-
sary to melt amber, is sufficient to destroy it. Phil. Tranf.
N 4 248. p. 25.

Could amber indeed be dissolved without impairing
its transparence, or one large mass be made of it by
uni ting several small ones, it is easy to see what would
be the advantages of a fuch a process. The art of em-
balmimg might possibly be also carried to a great height
by this, if we could preferve the human corpe in a
transparent cafe of amber, as the bodies of flies, spi-
ders, grafthoppers, &c. are to a great perfection.

Something of a substitute of this kind we have in fine
coals: which being dissolved by heat, and the bodies
of small animals several times dipped in it, they are
thus coated with collophiny, that in some degree re-
sembles amber; but this must be kept from dust.

Amber in substance has been much recommended
as a nervous and cordial medicine; and allledged to be
very efficacious in promoting the menifral discharge,
and the exclusion of the fucus and fecundines in la-
bour: but as in its crude flate it is quite insoluble by
our juices, it certainly can have very little effecl on
the animal fystem, and therefore it is now feldom
given in substance. The forms in which amber is pre-
pared are, A incharé, a cell, and an oil; the prepa-
ation and ufe of which are described in the proper
place under the article PHARMACY.

AMBER-TREE, the English name of a species of
ANTHOSPERMUM.

AMBERG, a city of Germany, the capital of the
palatinate of Bavaria, with a good cattle, ramparts,
halfons, and deep ditches. It is feated near the con-
fines of France, on the river Wills. It drives a great
trade in iron and other metals, found in the neigh-
bouring mountains. E. Long. 12. 4. N. Lat. 20. 46.

AMBERGRIZE, AMBERGREASE, or GREY AM-
BER, in natural hifiory, is a solid, opake, ash-coloured,

fatty, inflammable substance, variegated like marble,
remarkably light, rugged and uneven in its surface,
and has a fragrant order when heated. It does not
ceffive with acids; it melts freely over the fire,
into a kind of yellow roth; and is hardly soluble in
spirit of wine.

It is found swimming upon the sea, or the sea-coast,
or in the sand near the sea-coast; especially in the At-
lantic ocean, on the sea-coast of Brazil, and that of Ma-
dagascar; on the coasts of Africa, of the East Indies,
China, Japan, and the Molucca islands; but most of
the ambergrize which is brought to England comes
from the Bahama islands, from Providence, &c. where
it is found on the coast. It is also sometimes found in
the abdomen of whales by the whale-fishermen, always
in lumps of various shapes and sizes, weighing from
half an ounce to an hundred and more pounds. The
piece which the Dutch East India Company bought
from the king of Tydor, weighed 182 pounds. An
American fisherman from Antigua found some years
ago, about 52 leagues south-east from the Windward
islands, a piece of ambergrize in a whale, which weighed
about 150 pounds, and sold for 300 l. Sterling.

There have been many different opinions concerning
the origin of this substance.

It has been supposed to be a fossil bitumen or naph-
tha, exuding out of the bowels of the earth in a fluid
form, and distilling into the sea, where it hardens and
floats on the surface. But having been frequently
found in the belly of whales, it has by others been
considered as entirely an animal production.

Clausius ascribed it to be a phlegmatic recrement, or
indurated indigifible part of the food, collected and
found in the foam of the whale, in the fame man-
ner as the BEZOARS are found in the fomachs of other
animals.

In an account communicated by Paul Dudley, Esq;
in the 23d volume of the Philosophical Transac-
tions, the ambergrize found in whales is represented as a kind
of animal produfct, like mufk, and castoreum, &c.
fercated and collected in a peculiar bag or bladder, which
is furnished with an excretory duct or canal, the spuit
of which runs tapering into and through the length of
the penis; and that this bag, which lies just over the
teficles, is almost full of a deep orange-coloured liquor,
not quite fo thick as oil, of the fame flmell as the balls
of ambergrize, which float and swim loose in it; whose
colour and liquor may also be found in the canal of the
penis; and that therefore ambergrize is never to be
found in any female, but in the male only. But these
circumstances are not only deftrict of truth, but also
contrary to the laws of the animal econony: For, in
the firft place, ambergrize is frequently found in females
as well as males; although that found in females is
never in fuch large pieces, nor of fo good a quality, as
what is found in males. Secondly, No perfon who has
the leafl knowledge in anatomy or phyfology, will e-
ever believe that organifed bodies, fuch as the beams of
the Sepia, which are fo continually found in amber-
grize taken out of the whale, can have been aborbed
from the intestines by the lachets or lymphatics, and
collectcd with the ambergrize in the precluded bag a-
bovementioned.

Kempfer, who has given us fo many other faithful
accounts in natural hifiory, seems to come nearer the
truth
in the spermactei whale; and they are so convinced of this fact, that whenever they hear of a place where ambergris is found, they always conclude that the fea in that part are frequented by this species of whale.

The persons who are employed in the spermactei whale fishery, confine their views to the physeter macrocephalus. They look for ambergris in all the spermactei whales they catch, but it seldom happens that they find any. Whenever they hook a spermactei whale they observe, that it constantly not only vomits up whatever it has in its stomach, but also generally discharges its faeces at the time; and if this latter circumstances takes place, they are generally disappointed in finding ambergris in its belly. But whenever they discover a spermactei whale, male or female, which seems torpid and sickly, they are always pretty sure to find ambergris, as the whale in this state seldom voids its faeces upon being hooked. They likewise generally meet with it in the dead spermactei whales, which they sometimes find floating on the sea. It is observed also, that the whale, in which they find ambergris, often has a morbid protuberance; or, as they express it, a kind of gathering in the lower part of its belly, in which, if cut open, ambergris is found. It is observed, that all those whales, in whose bowels ambergris is found, seem not only torpid and sick, but are also constantly leaner than others; so that, if we may judge from the constant union of these two circumstances, it would seem that a large collection of ambergris in the belly of the whale is a source of disease, and probably sometimes the cause of its death. As soon as they hook a whale of this description, torpid, sickly, emaciated, one that does not dung on being hooked, they immediately either cut up the abovementioned protuberance, if there be any, or they rip open its bowels from the orifice of the anus, and find the ambergris, sometimes in one sometimes in different lumps, of generally from three to twelve and more inches in diameter, and from one pound to twenty or thirty pounds in weight, at the distance of two, but most frequently of about six or seven feet from the anus, and never higher up in the intestinal canal; which, according to their description, is, in all probability, the intestinum caecum, hitherto mistaken for a peculiar bag made by nature for the secretion and collection of this singular substance. That the part they cut open to come at the ambergris is no other than the intestinal canal is certain, because they constantly begin their incision at the anus, and find the cavity every where filled with the faeces of the whale, which from their colour and smell it is impossible for them to mistake. The ambergris found in the intestinal canal is not so hard as that which is found on the fae or sea-coast, but soon grows hard in the air: when first taken out, it has nearly the same colour, and the same disagreeable smell, though not so strong, as the more liquid dung of the whale has; but, on exposing it to the air, it by degrees not only grows greyish, but its surface is covered with a greyish dust like old chocolate, but it also loses its disagreeable smell, and, when kept for a certain length of time, acquires the peculiar odour which is so agreeable to most people.

The gentlemen the Doctor conversed with confessed, that if they knew not from experience that ambergris thus found will in time acquire the abovementioned qua-
qualities, they would be distinguished from hard indurated faces. This is so true, that whenever a whale voids its faces upon being hooked, they look carefully to see if they cannot discover among the more liquid excrements (of which the whale discharges several barrels) some pieces floating on the sea, of a more compact substance than the rest; these they take up and wash, knowing them to be amber-grife.

In considering whether there be any material difference between amber-grife found upon the sea or coast, and that found in the bowels or among the dung of the whale, the Doctor refutes the opinion, that all amber-grife found in whales is of an inferior quality, and therefore much less in price. Amber-grife, he observes, is only valued for its purity, lightness, compactness, colour, and smell. There are pieces of amber-grife found on different coasts, which are of a very inferior quality; whereas there are often found in whales pieces of it of the first value; nay, several pieces found in the same whale, according to the abovementioned qualities, are more or less valuable. All amber-grife found in whales has at first when taken out of the intestines very near the same smell as the liquid excrements of that animal have; it has then also nearly the same blackish colour: they find it in the whale sometimes quite hard, sometimes rather soft, but never so liquid as the natural faces of that animal. And it is a matter of fact, that, after being taken out and kept in the air, all amber-grife grows not only harder and whiter, but also loses by degrees its smell, and attains such an agreeable one, as that in general has with which it is found swimming upon the sea; therefore the goodnes of amber-grife seems rather to depend on its age. By being accumulated after a certain length of time in the intestinal canal, it seems even then to become of a whiter colour, and loses ponderous, and acquires its agreeable smell. The only reason why amber-grife found floating on the sea generally poises the abovementioned qualities in a superior degree, is because it is commonly older, and has been longer exposed to the air. It is more frequently found in males than females; the pieces found in males are in general smaller, and those found in males seem constantly to be larger and of a better quality, and therefore the high price in proportion to the size is not merely imaginary for the rarity-fake, but in some respect well founded, because such large pieces appear to be of a greater age, and possesses the abovementioned qualities in general in a higher degree of perfection than smaller pieces.

It is known, that the Sepia octopoda, or cuttle-fish, is the constant and natural food of the spermacte whale, or Physeter macrocephalus. Of this the filters are so well perfuaded, that whenever they discover any recent relics of it swimming on the sea, they conclude that a whale of this kind is, or has been, in that part. Another circumstance which corroborates the fact is, that the spermacte whale on being hooked generally vomits up some remains of the Sepia. Hence it is easy to account for the many beaks, or pieces of beaks, of the Sepia found in all amber-grife. The beak of the Sepia is a black horny substance, and therefore passes undigested through the stomac into the intestinal canal, where it is mixed with the faces; after which it is either evacuated with them, or if these latter be preter-naturally retained, forms concretions with them, which render the animal sick and torpid, and produce an ob­fipation, which either in an abcefs of the abdomen, as has been frequently observed, or becomes fatal to the animal; whence in both the cases, on the burring of its belly, that inhabitants substance, known under the name of amber-grife, is found swimming on the sea, or thrown upon the coast.

From the preceding account, and his having constantly found the abovementioned beaks of the Sepia in all pieces of amber-grife of any considerable size, Dr. Swediar concludes with great probability, that all amber-grife is generated in the bowels of the Physeter macrocephalus, or spermacte whale; and there mixed with the beaks of the Sepia octopoda, which is the principal food of that whale. He therefore defines amber-grife to be the preternaturally hardened dung or faces of the Physeter macrocephalus, mixed with some indigestible relics of its food.

The use of amber-grife in Europe is now nearly confined to perfumery; tho' it has formerly been recommended in medicine by several eminent physicians. Hence the Eistentia Ambræ Hoffmanni, Tinhuræ Regia Cod. Parisini, Trochici de Ambra Ph. Wurtemberg, &c.

If we wish to try any medicinal effects from this substance, the Doctor observes, we must certainly not expect them from two or three grains, but give rather as many scupetes of it for a dose: though even then, he thinks, there would not be reason to expect much effect from it, as he had himself taken of pure undecorated amber-grife in powder 50 grains at once, without observing the least sensible effect from it. A sailor, however, who had the curiosity to try the effects of recent amber-grife upon himself, took half an ounce of it melted upon the fire; and found it a good purgative; which proves that it is not quite an inert substance.

In Asia and part of Africa amber-grife is not only used as a medicine and as a perfume, but considerable use is also made of it in cookery, by adding it to several dishes as a spice. A great quantity of it is also constantly bought by the pilgrims who travel to Mecca; probably to offer it there, and use make of it in fumulations, in the same manner as frankincense is used in Catholic countries. The Turks make use of it as an aphrodisiac. Our perfumers add it to scented pillars, candles, balls or bottles, gloves, and hair powder; and its essence is mixed with pomatums for the face and hands, either alone or mixed with musk, &c. tho' its smell is to fome persons extremely offensive.

Amber-grife may be known to be genuine by its fragrant scent when a hot needle or pin is thrust into it, and its melting like fat of an uniform consistence; whereas the counterfeit will not yield such a smell, nor prove of such a fat texture.—One thing, however, is very remarkable, that this drug, which is the most sweet of all the perfumes, should be capable of being remelted in fumell by a preparation of one of the most odious of all stinks. Mr. Honberg found, that a vessel in which he had made a long digestion of the human faces, acquired a very strong and perfect smell of amber-grife, insomuch that any one would have thought a great quantity of essence of amber-grife had been made in it. The perfume was strong and offensive, that the vessel was forced to be removed out of the laboratory.
AMBERT, a small town of France, in lower Auvergne, the chief place of a small territory called Liutadour. It is remarkable for its paper manufactury and camblets. E. Long. 3. 35. N. Lat. 45. 28.

AMBETTUWAY, in botany, a barbarous name of a tree, the leaves of which, when boiled in wine, are said to create an appetite, and is used by the people in Guinea with that intention.

AMBIBIANI, or Ambianesis civitas, now Amiens, a city of Picardy. It is called Samaria by Caesar and Cicero; which, according to Valerius, signifies the bridge of the Samara or Sonate. Ambitus is a later name, taken from that of the people, after the usual manner of the lower age.

AMBIDEXTER, a person who can use both hands with the same facility, and for the same purposes, that the generality of people do their right hands. As to the natural cause of this faculty, some, as Hoefer, attribute it to an extraordinary supply of blood and spirits from the heart and brain, which furnish both hands with the necessary strength and agility: others, as Nicholas Maffa, to an exact situation of the heart, inclining neither to the right hand nor left; and others to the right and left subclavian arteries being of the same height and the same distance from the heart, by which the blood is propelled with equal force to both hands. But these are only conjectures, or rather chimeras. Many think, that, were it not for education and habit, all mankind would be ambidexters; and in fact, we frequently find naries obliged to be at a good deal of pains before they can bring children to forego the use of their left hands. How far it may be an advantage to be deprived of half our natural dexterity, may be doubted. It is certain, there are infinite occasions in life, where it would be better to have the equal use of both hands. Surgeons and surgeons are of necessity obliged to be ambidexters; bleeding, &c. in the left-hip or left-ankle, and operations on the left-eye, cannot be well performed but with the left-hand. Various instances occur in history, where the left hand has been excercised preferably to the right. But by the laws of the ancient Scythians, people were enjoined to exercise both hands alike; and Plato enjoins ambidexterity to be observed and encouraged in his republic.

AMBIDexter, among English lawyers, a juror or embrasser, who accepts money of both parties, for giving his verdict; an offence for which he is liable to be imprisoned, for ever excluded from a jury, and to pay ten times the fine he accepted of.

AMBIENT, a term used for such bodies, especially fluids, as encompass others on all sides; thus, the air is frequently called an ambient fluid, because it is diffused round the earth.

AMBIGENÆVES, in the heathen sacrifices, an appellation given to such ewes as, having brought forth twins, were sacrificed together with their two lambs, one on each side. We find them mentioned among other sacrifices to Juno.

AMBIGENÆAL HYPERBOLA, a name given by Sir Isaac Newton to one of the triple hyperbolas of the second order, having one of its infinite legs falling within an angle formed by the asymptotes, and the other without.

VOL. I.
AMBLESIDE, a town in Westmoreland, seated at one end of Winandermeer, W. Long. 0. 49. N. lat. 54. 30.


AMBLYGNON, in geometry, denotes an obtuse-angled triangle, or a triangle one of whose angles consists of more than 90 degrees.

AMBLE, in horsemanship, a peculiar pace by which a horse's two legs of the same side move at the same time. See HORSEMANN.

AMBLE, a kind of pulpit or desk, in the ancient churches, were the priests and deacons stood to read or sing part of the service, and preach to the people; called also AMBULIUM. The term is derived from ambulare, "to mount."—The ambo was mounted upon two abuts; whence some also derive the appellation from the Latin ambo, "both."

The ambo was ascended by steps; which occasioned that part of the office performed there to be called the Gradual. See GRADUAL.

Besides the gospel, which was read at the top of the ambo, and the epistle, which was read at a step lower, they likewise published from this place the acts of the martyrs, the commemoration of departed saints, and the letters of peace and communion sent by one church to another: here, too, converts made a public profession of their faith; and bishops, their defence, when accused: treaties also were sometimes concluded, and the coronations of emperors and kings performed, in the same place.

The modern reading-desks and pulpits have been generally substituted to the ancient Ambos; though, in some churches, remains of the ambos are still seen. In that of St John de Lateran at Rome, there are two moveable ambos.

AMBOITSMEH, or VONITSANGHOMSE, a province of the island of Madagascar, so called from some red mountains of the same name, lying in S. Lat. 20°. These mountains are very high, resembling the

Tafelburg of the Cape of Good Hope. On one side of this ridge the sea extends into the country for fifteen leagues; on the other is a flat country abounding in ponds and marshes. Here is also a lake fifteen leagues in length, and the same in breadth, containing many small islands. The inhabitants of the mountains are called Zafarangoh; and have plenty of gold, iron, cattle, silk, &c.

AMBOISE, a town of France, in Toursafi, seated at the confluence of the rivers Loire and Masse. The town is mean and ill built; but has been rendered famous in history by the conspiracy of the Protéfan, in 1560, which opened the fatal wars of religion in France. The castle is situated on a craggy rock, extremely difficult of access, and the sides of which are almost perpendicular. At its foot flows the Loire, which is divided into two streams by a small island.

To this fortress the duke of Guife, when he expected an insurrection among the Huguenots, removed Francis II. as to a place of perfect security. Only two defended parts of the ancient castle now remain, one of which was constricted by Charles VIII. and the other by Francis I. The former of those princes was born and died at Amboise. The town is situated E. Long. 1. 30. N. Lat. 47. 25.

AMBOULE, a province of Madagascar, somewhat to the northward of S. Lat. 23°. It is a fertile and agreeable country, watered by the river Manampani, whose mouth lies in S. Lat. 23. 30. The country produces plants and fruits in plenty. Iron mines are also found here. The black cattle are extremely fat, and their flesh excellent. In this province stands a large town of the same name; near which is a fountain of hot water, within 20 feet of a small river whose land is also burning. The water of the fountain is said to boil an egg hard in two hours; and the inhabitants affirm it to be a sovereign remedy against the goat. The people here are employed in different preparations of iron and steel, which they have from their own mines, and forge several instruments with tolerable skill. Their governor is honoured with the title of Rabbartau, or Great Lord. He exercises sovereign authority and absolute power; but is frequently, in times of distress, surprised by his subjects, who assemble in great numbers, seize his person, and threaten him with death unless they are relieved. To extricate himself from this dilemma, he is instantly obliged to issue orders for distributing provisins among them; but is usually repaid with interest, a quadruple return being made in a plentiful harvest. The people of Amboise live in great licentiousness with their superiors, and their country is generally a retreat for the roguish and lazy.

AMBOYNA, one of the Molucca islands, in the East Indies. It lies in S. Lat. 3. 36. and E. Long. 126. 20. and is remarkable for being the centre of the commerce for nutmegs and cloves, which is entirely monopolized by the Dutch East-India company. It is about 24 leagues in circumference. Besides cloves, it likewise abounds in most of the tropical fruits and fish; nor is there here any deficiency of good water; but fish is very scarce. This scarcity, however proceeds more from the policy of the Dutch than either the intemperance of the climate or the barrenness of the soil: For, excepting cloves, they have in Amboyna,
Amboyna, as well as the Moluccas, industriously discouraged the cultivation of every sceleant commodity, with the view of with-holding subsistence from those who might be tempted to invade them.

Of the natives, the men wear large whiskers, but leave little hair upon their chin; and have only a light piece of stuff wrapped round their middle. The women tie their hair in knots: the maids are bought of their fathers before they are married; and if the wife proves barren, the marriage is dissolved. Some of the natives are Mahometans, and some Christians: but they are all said to be lazy, deceitful, and treacherous. They make war with small swift vessels, in shape like dragons with regard to the head and tail. Their houses are built of bamboo-canes and fago-trees. They sleep on mats. Their weapons are bows and arrows, javelins, scythes, and targets.

Amboyna was first discovered by the Portuguese, who built a fort upon it, which was taken from them by the Dutch in 1605. They did not, however, become masters of the whole island at once. The English had here five factories, which lived under the protection of the Dutch East India Company, holding the factories of the natives Mahometans, and some Christians: but they are all said to be lazy, deceitful, and treacherous. They make war with small swift vessels, in shape like dragons with regard to the head and tail. Their houses are built of bamboo-canes and fago-trees. They sleep on mats. Their weapons are bows and arrows, javelins, scythes, and targets.

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This was difficult by the quantities of gold-dust that were washed from some mountains by the torrents.

Here also grow several kinds of valuable wood, of which they made tables, chairs, efitotrois, &c. for the principal persons in the government; and the rest is sold all over the Indies at a very extravagant rate.

Ambonua is divided into two parts, viz. a greater and lesser peninsula. The former, called ilius, is 12 leagues in length, and two and a half broad. In this the Dutch have no lesse which principal persons in the government; and the latter to be continually upon their guard, and to redoubts, mounted with cannon. The other is called small defiance from the sea. At government but a small number are Dutch; and this by nature and art, as to be in a manner impregnable; broad, which is the southerm compafs. The compafs. The line being completed, the lines were Dutch; and this by the river, but with communication of their forts, or rather strong redoubts, mounted with cannon. The other is called Lestimer, five leagues in length, and one and a half broad, which is the southern part of the island; on this stands the fort of Victoria, which is the residence of the governor, and his council, composed of 15 gentlemen or merchants. The fortres is a square, the ramparts mounted with 60 pieces of brass cannon, and the garrisons usually composed of 600 men. It is so strong by nature and art, as to be in a manner impregnable; and so effectively does it command the harbour, that no vessel could come in or go out without being fank by the cannon, if the governor chose. The inhabitants of Ambonua are computed at 70 or 80,000, of whom but a small number are Dutch; and this obliges the latter to be continually upon their guard, and to keep a competent number of troops in each of their forts, particularly in that of Middleburgh, which stands upon the island that connects these peninsulas. There are also redoubts and garrisons in all the isles of this government.

AMBRACIA; one of the most considerable cities of ancient Epirus, situated on the river Arazthus, at a small distance from the sea. At first it was a free city; but was afterwards reduced by the Macedonians, and especially by the Romans, who chose it for the place of their residence. In process of time, the Epirots made themselves masters of it, and held it till the year before Christ 189, when it fell into the hands of the Romans. At this time Ambracia was a place of great strength. It was defended on one side by the river Arachthus, and on the other by steep and craggy hills; and surrounded with an high and thick wall, above three miles in compass. The Roman consul Fulvia began the siege by forming two camps, separated by the river, but with a communication between them; the Romans were posted in one, and the Epirots their allies in the other. He then threw up two lines, one of circumvallation, and the other of contravallation; and built a wooden tower, in form of a castle, over against the citadel, which stood on a hill. The Epirots, however, before the lines were quite finished, found means to throw about 1000 men into the place.

The lines being completed, the city was attacked in five different places at once. The battering-rams shook the walls on all sides; and the Romans, from their movable towers, pulled down the battlements with a kind of lyethes which they fastened to long beams. The besieged made a vigorous defence. They were night and day on the wall, and indefatigable in preventing the effects of the rams and lyethes. The strokes of the former they deadened, by letting down beams, large stones, lumps of lead, &c. by means of pulleys, upon them when they were in motion; the others they rendered useless, by pulling the beams which they were fastened into the city with hooks contrived for the purpose.

While Fulvia was carrying on the siege, Nicander the Aetolian pretor found means to throw 500 men into the city, under the command of one Nicodorus, with whom Nicander agreed to attack the Roman camp in the night-time; not doubting, that, if the garrison from within, and the army from without, fell upon them at the same time they would be obliged to raise the siege. Nicodorus narrowly watched the time at which he was ordered to fall; and though Nicander did not appear, marched out at the head of the garrison, armed with fire-brands and torches. The Roman centurions, surprised at this sight, ran to wake the legions, and soon spread a general alarm all over the camp. The legions marched in small bodies as they happened to meet, to repulse the enemy, whom they engaged in three different places. Two parties of the garrison were driven back; but the third, commanded by two Aetolian generals, made a great slaughter of the Romans; and, not finding themselves seconded by Nicander, retired in good order into the city.

Though the besieged were thus abandoned, and had no hopes of assistance, they continued to defend themselves with incredible vigour and resolution. The Romans had no sooner made a breach in the wall, but it was repaired, and a new one built behind it. The conful, therefore, altered his measures; and, instead of making breaches with the ram, began to undermine the wall, in hopes of throwing down great part of it at once, and entering the city before the besieged could have time to rebuild a new wall. The miners being covered, were not observed by the garrison, till the great quantities of earth brought out of the mine gave the alarm. The Aetolians immediately began a countermine; and having dug a trench of the depth they supposed the mine to be, they carried it along the wall, where they heard the strokes of the pick-axes of the Romans. When the two mines met, a battle ensued, first with pick-axes and spades, and then with swords and spears; but this attack did not last long, each party making themselves a kind of rampart with the loose earth. The Aetolians, in order to drive their enemies quite out of the mine, invented a machine, which they brought to the place where the two mines met: this was an hollow vessel with an iron bottom, bored through in many places, and armed with spikes at proper distances to prevent the enemy from approaching it. This vessel they filled with feathers, which they set on fire, and with bellows driving the smoke on the beligerents, obliged them to leave the mine, half-suffocated. This interval the Aetolians made use of in repairing the foundations of the wall.

The vigorous resistance made by the Ambracians, however, did not raise the courage of the nation in general, who were determined on a peace with Rome at all events. Fulvia, in the mean time, being defirous of getting possession of Ambracia before the conclusion of the peace, employed Amyntander, king of the Athenians, to persuade the inhabitants to surrender. As Amyntander had great interest in Ambracia, having long reided there, he easily persuaded them to capitulate on the following terms, viz. That the Aetolian garrison should have leave to march out of the city; that the inhabitants
AMBREADA, thus they call the false or facitious amber, which the Europeans use in their trade with the negroes on the coast of Africa, and particularly on the river Senegal. There are some large and red pearls in it, a thousand of which making twenty ropes or strings, weigh three pounds. There are others small, and also red, which weigh but two pounds and an half.

AMBRESBERRY, a market-town in Wiltshire, about six miles north of Salisbury, and situated in W. Long. 1°. 40' and N. Lat. 51° 20'.

AMBROINES, a Gaulish people who lived near the foot of the Alps, between Switzerland and Provence. They invaded the Roman territories in conjunction with the Cimbri and Teutones; but were defeated with great slaughter by Marius, about 107 years before Christ. Their women, who had flayed the enemy during the engagement in a kind of fortification made with their carts, on seeing their husbands lying, and the Romans at their heels, armed themselves with axes, and gnashing with their teeth, fell with fury on the pursuers and the pursued. Their first rage being spent, they desired to surrender themselves, upon the single condition, that their chastity should not be violated; but this equitable request being denied, they first killed their children, and then themselves, not one remaining alive out of the whole multitude.

AMBROSIA, a small island laid down in some of the most approved charts, and particularly mentioned in Mr. Robertson's Elements of Navigation, as lying in S. Lat. 25° 30'. W. Long. 82° 20'. It was searched for, however, in 1767, by Captain Carteret, with such diligence, that he concludes it to have no existence, as he could not discover land any where near that place.

AMBROSE (St.), bishop of Milan, one of the most eminent fathers of the fourth century, born in Gaul in the year 334, according to Dr. Cave, or in 340, as Mr. Du Pin affirms. His father was at this time prefidentes, in Gaul; and retired at Arles, the capital of Gallia Narbonensis. The birth of Ambrose is said to have been followed with a remarkable preface of his future eloquence; for we are told, that a swarm of bees came and settled upon his mouth as he lay in his cradle. He soon made himself master of the several parts of secular learning; and pleased caues before Probus with so much eloquence, that he was appointed his afeiller, and soon after governor of the provinces of Liguria and Æmilia. He settled at Milan; where, in the year 374, upon the death of Auxentius bishop of that city, there being a great contest between the Catholics and Arians concerning the choice of a new bishop, Ambrose thought it his duty, as governor, to go to the church, in order to compose the tumult. He accordingly addressed himself to the people in a gentle pathetic speech, to exhort them to return to their choice in a calm and friendly manner: while he was speaking to them, the whole assembly cried out with one voice, "Let Ambrose be bishop!" Such a sudden and unexpected incident surprized him extremely; so that he retired immediately, and used every method to divert them from their resolution of choosing him; but at last he was obliged to comply; and was baptiz'd (being but a catechumcn before), and ordained bishop, towards the latter end of the yeare 374, or beginning of 375. About the year 377, the barbarous nations making an incursion into the Roman empire, he fled to Illyricum, and afterwards to Rome. In the year 384, he was sent to the tyrant Maximus, who had usurped the empire, and prevailed upon him not to pass over into Italy. The heathens being encouraged by these intemperate commotions in the empire, attempted to restore their religion, and employed Q. Aurelianus Symmachus, preëxct of Rome, a man of great eloquence, to plead their cause. This gave rise to the famous contéll between St. Ambrose and him, about repairing the altar of Victory. But Symmachus having lost his cause, was expelled the city, and commanded not to approach within an hundred miles of it. The petition which he presented to the emperor Valentinian the younger, is still extant; we find in it the strongest figures of rhetoric and the greatest force of eloquence. St. Ambrose wrote a refutation of this petition; but he has been thought guilty of many paradoxes; and yet he protests, "that he endeavoured only after the solidity of reasoning, leaving Symmachus all the glory of eloquence and politeness; it being (says he) the peculiar privilege of the pagan philosophers to amuse the mind with colours as false as their idols; and to say great things, not being capable of saying true ones." Ambrose met with a good deal of opposition from the Arians, against whom he acted with great spirit and intrepidity. Julian the emperor and mother of Valentinian, who was an Arian, resolving to restore Arianism at Milan, began with demanding of St. Ambrose one of the churches, which was called the Portian church: but he refused it; and the people surrounding the palace in a body, he was obliged to leave him in possession of his church, and even desire him to pacify the people.

Ambrose was a second time sent to the tyrant Maximus, for Valentinian found no person so proper to negotiate with him. He spoke to him with great courage and boldness, but could obtain nothing; for Maximus soon after marched into Italy, and made himself master of the western empire: so that Valentinian was obliged to retire, with his mother Julianus and his sister Gala, to Thessalonica in Illyricum, in order to depose Theodosius his successor; who defeated Maximus, and restored Valentinian to the empire.

While Theodosius continued in Italy, after the defeat of Maximus, an insurrection happened at Thessalonica, in which several of the magistrates were yeoned, and their bodies dragged along the streets. Theodolus being informed of this, hastily commanded a certain number of the inhabitants to be put to death promiscuously. Ambrose thought it his duty, as governor, to go to the church, in order to compose the tumult. He accordingly addressed himself to the people in a gentle pathetic speech, to exhort them to return to their choice in a calm and friendly manner: while he was speaking to them, the whole assembly cried out with one voice, "Let Ambrose be bishop!" Such a sudden and unexpected incident surprized him extremely; so that he retired immediately, and used every method to divert them from their resolution of choosing him; but at last he was obliged to comply; and was baptiz'd (being but a catechumcn before), and ordained bishop, towards the latter end of the yeare 374, or beginning of 375. About the year 377, the barbarous nations making an incursion into the Roman empire, he fled to Illyricum, and afterwards to Rome. In the year 384, he was sent to the tyrant Maximus, who had usurped the empire, and prevailed upon him not to pass over into Italy. The heathens being encouraged by these intemperate commotions in the empire, attempted to restore their religion, and employed Q. Aurelianus Symmachus, preëxct of Rome, a man of great eloquence, to plead their cause. This gave rise to the famous contéll between St. Ambrose and him, about repairing the altar of Victory. But Symmachus having lost his cause, was expelled the city, and commanded not to approach within an hundred miles of it. The petition which he presented to the emperor Valentinian the younger, is still extant; we find in it the strongest figures of rhetoric and the greatest force of eloquence. St. Ambrose wrote a refutation of this petition; but he has been thought guilty of many paradoxes; and yet he protests, "that he endeavoured only after the solidity of reasoning, leaving Symmachus all the glory of eloquence and politeness; it being (says he) the peculiar privilege of the pagan philosophers to amuse the mind with colours as false as their idols; and to say great things, not being capable of saying true ones." Ambrose met with a good deal of opposition from the Arians, against whom he acted with great spirit and intrepidity. Julian the emperor and mother of Valentinian, who was an Arian, resolving to restore Arianism at Milan, began with demanding of St. Ambrose one of the churches, which was called the Portian church: but he refused it; and the people surrounding the palace in a body, he was obliged to leave him in possession of his church, and even desire him to pacify the people.

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AMBROSE, by which means the city was filled with the blood of many innocent persons, and amongst the rest several strangers who had but just come there: no regard was had to any distinction of persons, no form of trial was observed; but they were cut down like corn in the harvest, as Theodoret expresses it, to the number of 7000. At this time an assembly of bishops was held at Milan, who all expressed an abhorrence of such cruelty in the emperor. Ambrose wrote a letter to him, in which he represented the enormity of his crime, and exhorted him to make satisfaction by a sincere submission and repentance. Some time after, Theodosius coming to Milan, went to receive the sacrament at the great church; where Ambrose meeting him at the door, denied him entrance, and represented to him, in which he represented the enormity of Theodorus year after, Ambrose, being convinced of the sincerity of his repentance, admitted him into the church.

In 392, Valentinian the emperor being assassinated by the contrivance of Argobaltes, and Eugenius usurping the empire, Ambrose was obliged to leave Milan; but about a year after, Ambrose, being convinced of the sincerity of his repentance, admitted him into the church.

AMBROSE, in heathen antiquity, denotes the solid food of the gods, in contradistinction from the drink, which was called mel, or ambrosia. It had the appellation ambrosia (compounded of the particle an, and eperios, immortal) as being supposed to render those immortal who fed on it.

AMBROSE is also a splendid kind of title, given by some physicians to certain alexipharmic compositions, of extraordinary virtue. The name was particularly given to a famous antidote of Philip of Macedonia, against all poisons, bites, and stings of venomous creatures as well as many internal diseases.

AMBROSID, a genus of the pentandria order, belonging to the monoeia class of plants; and, in the natural method, ranking under the 49th order, Compositae-nucamentaceae. The characters are:—The male flowers are compound: The common calyx is a single-leaved perianthium, the length of the florets: The compound corolla is uniform, tubular, flat, and hemispherical; the proper is monopetalous, funnel-shaped, and quinquefert: The stamina consist of five very small filaments; the anther is erect, parallel, and pointed: The pistillum has a filiform style, the length of the stamina; the stigma orbicular and membranous: The receptacle is naked. Female flowers below the male ones, on the same plant, double: The calyx is a single-leaved perianthium, entire (with the belly quinquetented), one floreted, and persistent: There is no corolla: The pistillum has an ovate germ in the bottom of the calyx: a filiform style, the length of the calyx; and two long brizly stigmaae: The pericarpium is an ovate unilocular nut: The seed is singular and roundish. Of this genus five species are enumerated; but having no properties worthy of notice, we omit any further account of them.

AMBROSIAN Office, or Rite, in church-history, a particular formula of worship in the church of Milan, which takes its name from St Ambrose, who instituted that office in the fourth century. Each church originally had its particular office; and when the Pope, in after-times, took upon him to impose the Roman office upon all the western churches, that of Milan sheltered itself under the name and authority of St Ambrose; from which time the Ambrosian ritual has prevailed.

AMBROSIN, in middle-aged writers, denotes a coin struck by the lords or dukes of Milan, wherein was represented St Ambrose on horseback with a whip in his right hand. The occasion of this coinage is said to have been a vision of that saint, who appeared to the Milanese general in 339, during the time of a battle.

AMBROSIA, in botany, a genus of the polyandria order, belonging to the gynandria class of plants; the characters of which are: The calyx is a single-leaved latha, divided by a partition into two cells: There is no corolla: The stamina consist of a single filament in the interior cell; the anther are numerous,
The Amhrolius, numerous, with two roundish concave nectaries at their base; the pellifium is in the interior cell; the german roundish; the stylus cylintrical, and shorter than the spatha: the stigma oblate: The periampium (a capsule?) roundish and unilocular. There is but one species, a native of Turkey.

AMBROSIUS APRELIANUS, or Aurelius Ambrosi, a famous general of the ancient Britons, of Roman extraction. He was educated at the court of Aldroan of America; who, at the request of the Britons, sent him over with ten thousand men, to assist them against the Saxons, whom Vortigern had invited into Britain. Ambrosius had such success against the Saxons that the Britons chose him for their king, and compelled Vortigern to give up to him all the western part of the kingdom divided by the Roman highway called Watling-street. Some time after, the Britons being discontented with Vortigern, and having withdrawn their allegiance from him, he retired to a battle in Wales, where being besieged by Ambrosius, and the cattle taking fire, he perished in the flames, and left his rival sole monarch of Britain; who now took upon him the imperial purple, after the manner of the Roman emperors. Geoffrey of Monmouth tells us, that Ambrosius built Stonehenge near Salisbury in Wilts. Ambrosius, according to this historian, coming to a monastery near Caerarodac, now Salisbury, where three hundred British lords, massacred by Hengist, lay buried, and resolving to perpetuate the memory of this action, he ordered his workmen to prepare a large quantity of stones and other materials. But having, at the instigation of Tremonus archbishop of Caereleon, consulted the famous Merlin, this magician advised him to send over to Ireland for certain great stones, called chora gigantium, the giant's dance, placed in a circle on a hill called Kilair, having been brought thither by giants from the farthest borders of Africa. A body of forces were accordingly sent into Ireland, under Pendragon, Ambrosius's brother, to fetch these stones; but were opposed in their attempt by the Saxons, and vanquished this prince in battle, brought away the stones; and by the direction and assistance of Merlin, who had accompanied them, these wonderful stones, by order of Ambrosius, were placed over the graves of the British lords, and are now what is called Stonehenge. Alexander Mechan celebrates this fable in his poem De divina sapientia laudibus. Polydore Virgil affirms another origin of Stonehenge: he tells us it was erected by the Britons as a monument to their general Ambrosius, on the place where he fell in battle, to perpetuate the memory of his glorious actions and services done to his country. Both these stories are rejected by the best antiquaries; who, however, are by no means agreed as to the true origin of this famous piece of antiquity. See Stonehenge.

After the Britons had defeated the Saxons, and obliged them to retire northward, Ambrosius is said to have convened the princes and great men at York, where he gave orders for repairing the churches destroyed by the Saxons, and restoring the exercise of religion to its former lustre. This is confirmed by Matthew of Wellsminster; who highly applauds the great zeal of Ambrosius in repairing the churches, encouraging the clergy, and reaforning the honour of religion. The Monmouth historian gives this prince a very high character. "He was a man (says he) of such bravery and courage, that when he was in Gaul, no one durst enter the lists with him; for he was sure to unhorse his antagonist, or to break his spear into shivers. He was, moreover, generous in bestowing, careful in performing religious duties, moderate in all things, and more especially abhorred a lie. He was strong on foot, stronger on horseback, and perfectly qualified to command an army." The same author tells us he was poisoned at Winchester by one Eoga Saxon, disguised as a physician, and hired for that purpose by Palentius one of the sons of Vortigern: but the generally received opinion is, that he was killed in a battle which he lost in the year 509, against Cedric, one of the Saxon generals.

AMBRBY, a place in which are deposited all the utensils necessary for house-keeping. In the ancient abbeys and priories, there was an office under this denomination, wherein were laid up all charities for the poor.

AMBULAJÆ, in Roman antiquity, were immodest women, who came from Syria to Rome, where they lived by prostitution and by playing on the flute: the word is derived from the Syriac abah, which signifies a flute; altho' others make it to come from an and Bata, because these prostitutes often retired to Bata. According to Cruquius, these women used likewise to fell paint for ornamenting the face, &c.

AMBULANT, or ambulatory. They give in France the name of ambulant commiffiores to those commissioners, or clerks of the king's farms, who have not settled office; but visit all the offices within a certain distinc, to see that nothing be done in them against the king's right, and interest of the farm.

AMBULANT is also used to denote those brokers at Amsterdam or exchange agents, who have not been sworn before the magistrates. They transact brokerage business, but their testimony is not received in the courts of justice.

AMBULATORY, a term anciently applied to such courts, &c., as were not fixed to any certain place; but held sometimes in one place, and sometimes in another. In opposition to stationary courts.—The court of parliament was anciently ambulatory; so also were the court of king's bench, &c.

AMBURBIUM, in Roman antiquity, a procession made by the Romans round the city and pomerium, in which they led a victim, and afterwards sacrificed it, in order to avert some calamity that threatened the city.

AMBURY, or Ambur, among farriers, denotes a tumor, wart or swelling, which commonly happens in about eight days, growing very high on horsehair very hard about its root; and, when it has fallen off, which commonly happens in about eight days, strewing some powder of verdigris upon the part, to prevent the return of the complaint. If the tumor be so low that nothing can be tied about it, they cut it out with a knife, or else burn it off with a sharp hot iron; and, in fine parts, where a hot iron is improper, they eat it away with oil of vitriol, or white sublimate.

Many
Ambuscade Many of our forriers boast of a secret which infallibly cure all kinds of protuberances of this kind; the preparation of which is this: Take three ounces of green vitriol and one ounce of white arsenic; beat them to a coarse powder, and put them into a crucible; place the crucible in the midst of a charcoal fire, stirring the sublimate, but carefully avoiding the poisonous steam; when the whole grows red, take the crucible out of the fire, and when cool, break it and take out the matter at the bottom; beat this to powder in a mortar, and add to four ounces of this powder five ounces of whitewash; make the whole into an ointment, and let it be applied cold to warts; rubbing them with it every day. They will by means of this fall off gently and easily, without leaving any swellings. It is best to keep the horse quiet, and without working, during the cure. What fores remain on the parts which the swellings fall off from, may be cured with the common application called the counterfoot's ointment.

AMBUSCADE, or AMBUSHE, in the military art, properly denotes a place where folders may lie concealed till they find an opportunity to surprize the enemy.

In the language of Scripture, these terms are not always taken in their proper significance, for laying ambuscades for any one, attacking him in secret, laying snares for him. They sometimes signify no more than attacking a man who has no right to such a thing; attacking one behind, concealing one's self in some green particular place in order to surprize any one. See the book of Judges, ch. ix. 25. 32. 34. 35. Abimelech, who lay lurking with his people in the heights of Sichem, fo, however, as to rob and treat those who passed that way very ill, came and attacked the city of Sichem with his troops divided into three bodies: Tendeit infidias juxta Sichinam in quatuor locis. Literally, according to the Hebrew, "They prepared ambuscades against Sichem in four heads or companies." And a little farther, verse 45. Abimelech being informed that the Sichemites were marched, took his army and divided it into three bodies, and laid wait for them in the field. It seems certain that in these passages, ambuscades, properly so called, were not the things in question. In the first book of Samuel, Saul complains that David laid ambuscades for him: Invidiator nefque bodie permanens. Now nothing could be worse grounded than this accusation, if we understand the word indignari in its proper signification; but he might say, though unjustly, that David was his secret enemy. And in the Chronicles it is said, that God turned the ambuscades laid by the enemies of Israel upon themselves; that is to say, their endeavours, their malice, their arms, he turned against themselves: for the enemies there mentioned came not in private or by surprizam; they marched openly in arms against Israel.

AMBY, a town of the Austrian Netherlands, in the province of Limburg, situated opposite to Maerfricht, on the east side of the river Maas, in E. Long. 5° 45. N. Lat. 50° 57'.

AMEDIANS, in church-history, a congregation of religious in Italy, so called from their professing themselves amantes Deum, "lovers of God;" or rather amati Deus, "beloved of God." They wore a grey habit and wooden shoes, had no breeches, and girt themselves with a cord. They had 26 convents; and were united by Pope Pius V, partly with the Cistercian order, and partly with that of the Scolopi, or wooden-shoe wavers.

AMELIA, an episcopal city of Italy, in the state of the church, seated on a mountain, 50 miles N. E. of Rome, and 25 miles S. W. of Spoleto. E. Long. 13° 20'. N. Lat. 42° 33'.

AMELLUS, STARWORT: A genus of the polyg- mania superflus order, belonging to the syngeneia classei plants; and in the natural method ranking under the 42th order, Composite- opposiffilia. The characters are: The common calyx is imbricated and roundish: The compound corollia is radiated; the hermaphrodite corollas numerous in the disk; the female numerous in the ray: Proper corolla of the hermaphrodites are tubular and quinquefid; of the females, tongued, loose, and two or three toothed: The flamina in the hermaphrodites consist of five short capillary filaments; the antherae cylindric and tubular: The pistillum has an ovate germen; a filiform stylus the length of the flamina; and two filiform stigmas: There is no pericarpium, but the calyx unchanged: The seeds are ovate and foliary: the pappus is hairy; the receptaculum chaffy. Of this there are two.

Species. 1. The lychnitis, with one flower on each footstalk. This is a native of the Cape of Good Hope. It is a perennial plant, rising about three feet high, sending out many branches on each side, so as to form a bushy plant; the branches are garnished with oblong spear-shaped leaves placed opposite, and are terminated by single naked flower-stalks, each supporting one violet-coloured flower, having a yellow disk, which is succeeded by oblong seeds. 2. The umbellatus, with flowers growing in umbels, is a native of Jamaica; and rises from two to three feet high, sending out many branches cloathed with opposite leaves, which are terminated by small flowers in umbels.

Culture. The first is easily propagated, either by cuttings planted in the summer-months, or by seeds sown on a moderate hot-bed in the spring, but the plants require a flight shelter in winter. The second is much more tender, and therefore requires to be preserved in a stove during the winter season.

AMELOT DE LA HOUSSET (Nicholas), born at Orleans in 1634, was much esteemed at the court of France, and appointed secretory of an embassy which court sent to the commonwealth of Venice, as appears by the title of his translation of Father Paul's History of the Council of Trent; but he afterwards published writings which gave such offence that he was imprisomed in the Bastile. The fifth works he printed were the History of the Government of Venice, and that of the Ufcocks, a people of Croatia. In 1668 he published his translation into French of Machiavel's Prince, and Father Paul's History of the Council of Trent, and Political Discourses of his own upon Tacitus. These performances were well received by the public. He did not prefix his own name to the two last mentioned works, but concealed himself under that of La Mothe Joffeval. His translation of Father Paul was attacked by the partisans of the pope's unbounded power and authority. In France, however, it met with great success; all the advocates for the liberty of the Gallican church poreading the success of the to the tumult of their power; though at the same time there were these memorials presented
AMELEOT, attended by AMELEOT, presented to have it suppressed. When the second edition of this translation was published, it was violently attacked by the Abbé St Real, in a letter he wrote to Mr Bayle, dated October 17, 1685. Amelot defended himself, in a letter to St Real, entitled a letter to St Real, entitled

He printed at Paris a French translation of Baltafar Gracian's Oraculo manual, with the title of l'Honneur de Cour. In 1686, he printed La Morale de Tacite de la fraternité, in which he collected several particular facts and maxims, which represent in a strong light the artifices of court-flatterers, and the mischievous effect of their poisonous discourses. Frederick Leonard, a bookseller at Paris, having proposed, in the year 1692, to print a collection of all the treaties of peace between the kings of France and all the other princes of Europe, since the reign of Charles VII. to the year 1690, Amelot published a small volume in duodecimo, containing a preliminary discourse upon these treaties; wherein he endeavours to show, that most princes, when they enter into a treaty, think more how to evade than how to perform the terms they subscribe to. He published also an edition of Cardinal d'Offet's Letters in 1697, with several observations of his own; which, as he tells us in his advertisement, may serve as a supplement to the history of the reigns of Henry III. and Henry IV. kings of France. He wrote several other works; and died at Paris in 1706, being then almost 72 years of age.

AMELOT (Denis), a celebrated French writer, was born at Saintonge in 1606. He maintained a close correspondence with the fathers of the Oratory, a congregation of priests founded by Philip Neri. He wrote the life of Charles de Condren, second superior of this congregation, and published it at Paris in 1643. In this piece he said something of the famous Abbé of St Cyran, which greatly displeased the gentlemen of Port Royal, who, to be revenged of him, published a libel against him, intitled Idées générales de l'esprit et de l'ame en France. He was so much provoked by this satire, that he did all in his power to injure them.

They had finished a translation of the New Testament, and were zealous to have it published; for which purpose they endeavoured to procure an approbation from the doctors of the Sorbonne, and a privilege from the chancellor, preventing them from succeeding. In this he had also a view to his own interest; for he was about to publish a translation of his own of the New Testament. Amelot's translation with annotations, in 4 vols. octavo, was printed in the years 1666, 1667, and 1668. It is not very exact, according to P. Simon, who tells us that it contains some very gross blunders. Amelot wrote also an Abridgment of Divinity, a Catechism for the Jubilee, and a kind of Christiana Manual for every Day. Towards the end of his life, he entered into the congregation of the Oratory in 1690; and continued amongst them till his death, which happened in 1678.

AMENN, Amen., signifies true, faithful, certain. It is made use of likewise to affirm anything, and was a sort of affirmation used often by our Saviour: Amen. Amen. I say unto you. Lastly, it is understood as expressing a wish; as Amen, Amen.

So be it, Numb. v. 22. or an affirmation, Amen, yes, I believe it, 1 Cor. xiv. 16. The Hebrews end the five books of Psalms, according to their way of distributing them, with the words amen, amen; which the Sepulchritans have translated amen, amen; and the Latin, fiat, fiat. The Greek and Latin churches have preserved this word in their prayers, as well as alleluia and istanna; because they observed more energy in them than in any terms which they could use in their own languages. At the conclusion of the public prayers, the people answered with a loud voice, Amen; and St Jerom says, that at Rome when the people answered Amen, the sound of their voices was like a clap of thunder: In simulitationem caelestis tonitru Amen reboat. The Jews affirm that the gates of Heaven are opened to him who answers Amen with all his might.

AMENDE, or AMENDMENT, in the French случions, a pecuniary punishment imposed by a judge for any crime, false accusation, or groundless appeal.

AMENDE Honourable, an infamous kind of punishment inflicted in France upon traitors, parricides, or sacrilegious persons, in the following manner: The offender being delivered into the hands of the hangman, his shirt is stripped off, a rope put about his neck, and a taper in his hand; then he is led into court, where he must beg pardon of God, the king, the court, and his country. Sometimes the punishment ends here; but sometimes it is only a prelude to death, or banishment to the galleys.

AMENDMENT Honourable, is a term also used for making recantation in open court, or in presence of the person injured.

AMENDMENT, in a general sense, denotes some alteration or change made in a thing for the better.

AMENDMENT, in law, the correction of an error committed in the process, which may be amended after judgment, unless the error lies in giving judgment; for in that case it is not amendable, but the party must bring a writ of error. A bill may be amended on the file at any time before the plea is pleaded; but not afterwards, without motion and leave of the court.

AMENDMENT of a Bill, is some alteration made in the first draught of it.

AMENTUM, in botany, the name of a species of calyx, consisting of valves, and hanging down in different directions from the calyx. Common oats afford a good example of the amentum.

AMENEM, in Roman antiquity, a thong tied about the middle of a javelin or dart, and fastened to the forefinger, in order to recover the weapon as soon as it was discharged. The ancients made great use of the amentum, thinking it helped to enforce the blow. It also denotes a latchet that bound their sandals.

AMERADE, a kind of officers among the Saracens, answering to the governors of provinces among the Europeans. The name is originally the name with that of emir.

AMERCEMENT, or AMERCIAMENT, in law, a pecuniary punishment imposed on offenders at the mercy of the court. It differs from a fine in being imposed arbitrarily in proportion to the fault; whereas a fine is a certain punishment settled expressly by some statute.
America is not of equal breadth throughout its whole extent; but is divided into two great continents, called "North," and "South America," by an isthmus 1500 miles long, and which, at Durinc, about Lat. 9° S. is only 50 miles over. This isthmus forms, with the northern and southern continents, a vast gulf, in which lie a great number of islands, called the "West-Indies," in contradistinction to the eastern parts of Asia, which are called the "East-Indies."

"Next to the extent of the New-World, the grandeur of the objects which it presents to view, is most apt to strike the eye of an observer. Nature seems here to have carried on her operations upon a larger scale, and with a bolder hand, and to have displayed the features of this country by a peculiar magnificence. The mountains of America are much superior in height to those in the other divisions of the globe. Even the plain of Quito, which may be considered as the base of the Andes, is elevated farther above the sea than the top of the Pyrenees." The most elevated point of the Andes, according to Don Ulloa, is twenty thousand, two hundred, and eighty feet, which is, at least, seven thousand, one hundred, and two feet above the Peak of Teneriffe, which is the highest known mountain in the ancient continent. (See the article Andes.)

From the lofty and extensive mountains of America descend rivers with which the streams of Europe, of Asia, or of Africa, are not to be compared, either for length of course, or for the vast volumes of water which they pour into the oceans. The Danube, the Indus, the Ganges, or the Nile, in the ancient Hemisphere, are not of equal magnitude with the St. Laurence, the Missouri, or the Mississippi, in North-America; or with the Maraguan, the Orinoco, or the Plata, in South-America. The rivers in the latter of these American continents are like vall arms of the sea. (See the articles St. Laurence, Missouri, & c.)

"The lakes of the New-World are no less conspicuous for grandeur than its mountains and rivers. There is nothing in other parts of the globe which resembles the prodigious chain of lakes in North-America. They may be properly termed inland seas of fresh water; and even those of the second or third class of magnitude, are of a larger circuit (the Capeian sea excepted) than the greatest lake of the ancient continent." (See the articles Superior, Huron, Erie, &c.)

The luxuriance of the vegetable creation in the New-World is extremely great. In the southern provinces, where the moisture of the climate is aided by the warmth of the sun, the woods are almost impervious, and the surface of the ground is hid from the eye, under a thick covering of shrubs, of herbs, and weeds of vegetation. In the northern provinces although the forests are not so encumbered with the same mild luxuriance of vegetation, the trees of various species are generally more lofty, and often much larger, than are to be seen in any other parts of the world.

One of the most remarkable circumstances, or features, of the New-World, is the general predominance of cold, throughout the whole extent of this great continent. Though we cannot, in any country, determine the precise degree of heat merely by the distance of the equator, because the elevation above the sea, the nature of the soil, &c. all affect the climate; yet, in the Ancient Continent, the heat is much more in proportion to the vicinity to the equator than in any part of America. Here the rigour of the frigid zone extends over half that which should be temperate by its position. Even in those latitudes where the winter is scarcely felt in the Old-Continant, it reigns with great severity in America, though during a short period. Nor does this cold, prevalent in the New-World, confine itself to the temperate zones; but extends with the west wind over the western part of the continent, and with the east wind, along the eastern coast, to the torrid zone also, considerably mitigating the excess of its heat.—Along the eastern coast, the climate, tho' more similar to that of the torrid zone in other parts of the earth, is nevertheless considerably milder than in the countries of Asia and Africa which lie in the same latitude. From the southern tropic to the extremity of the American continent, the cold is said to be much greater than in parallel northern latitudes even of America itself.

For this remarkable difference between the climate of the New-Continant and the old, various causes have been assigned by different authors. The following is the opinion of the celebrated Dr. Robertson on this subject. "Though the utmost extent of America towards the north is yet not discovered, we know that it advances nearer to the pole than either Europe or Asia. The latter have large seas to the north, which are open during part of the year; and even when covered with ice, the wind that blows over them is less intensely cold than that which blows over land in the same latitude. But, in America, the land stretches from the river St Laurence towards the pole, and spreads out immenely to the west. A chain of enormous mountains, covered with snow and ice, runs thro' all this dreary region. The wind passing over such an extent of high and frozen land, becomes so impregnated with cold, that it acquires a piercing keenness, which it retains in its progress through warmer climates; and is not entirely mitigated until it reach the gulf of Mexico. Over all the continent of North-America, a north-westerly wind and excursive cold are synonymous terms. Even in the most sultry weather, the moment that the wind veers to that quarter, its penetrating influence is felt in a transition from heat to cold no less violent than sudden. To this powerful cause we may ascribe the extraordinary dominion of cold, and its violent inroads into the southern provinces in that part of the globe. "Other causes, no less remarkable, diminish the active
The climate of America is its extreme moisture in general. In some places, indeed, moisture of the western coast, rain is not known; but, in all other parts, the moistness of the climate is as remarkable as the cold. — The forests wherever it is it is every where covered, no doubt, partly, occasion the moistness of its climate; but the most prevalent and obvious cause is the vast quantity of water in the Atlantic and Pacific Oceans, with which America is environed on all sides. Hence, those places where the continent is narrowest are deluged with almost perpetual rains, accompanied with violent thunder and lightning, by which some of them, particularly Porto-Bello, are rendered in a manner uninhabitable.

From the coldness and the moisture of America, an Malignity extreme malignity of climate has been inferred, and at- ferred by M. de Pauw in his Recherches Philosophiques unjustly a- par les Américains. Hence, according to the hypothesis of this author, the smallness and irregularity of the nobler animals, and the size and enormous multiplication of reptiles and insects.

But the supposed smallness and ferocity of the American animals, the Abbé Clavigero observes, instead of the malignity, demonstrates the mildness and vol. II. bounty of the climate, if we give credit to Buffon, at p. 253: whose fountain M. de Pauw has drank, and of whose testimony he has availed himself against Don Pernetty. Buffon, who in many places of his Natural History produces the smallness of the American animals as a certain
certain argument of the malignity of the climate of America; in treating afterwards of savage animals, in Tom. II. speaks thus: "As all things, even the most free creatures, are subject to natural laws, and animals as well as men are subjected to the influence of climate and soil, it appears that the same causes which have civilized and polished the human species in our climates, may have likewise produced similar effects upon other species. The wolf, which is perhaps the fiercest of all the quadrupeds of the temperate zone, is, however incomparably less terrible things which are temperate; the wolf, the lion, and the panther of the torrid zone; and the white bear and hyena of the frigid zone. In America, where the air and the earth are more mild than those of Africa, the tyger, the lion, and the panther, are not terrible but in the name. They have degenerated, if fierce, joined to cruelty, made their nature; or, to speak more properly, they have only suffered the influence of the climate: under a milder sky their nature also has become more mild. From climes which are immediate in their temperature are obtained drugs, perfumes, poisons, and plants whose qualities are strong. The temperate earth, on the contrary, produces only things which are temperate; the mildest herbs; the most wholesome pulse, the sweetest fruits, the most quiet animals, and the most humane men, are the natives of this happy clime. As the earth makes the plants, the earth and plants make animals; the earth, the plants, and the animals make man. The physical qualities of man, and the animals which feed on other animals, depend, though more remotely, on the same causes which influence their dispositions and customs. This is the greatest proof and demonstration, that in temperate climates everything becomes temperate, and that in the same temperate climates, the effects are more striking and determinate qualities, depend notwithstanding, like the relative qualities, on the influence of climate. The size of our quadrupeds cannot be compared with that of an elephant, the rhinoceros, or sea-horse. The largest of our birds are but small if compared with the ostrich, the condore, and caynare." So far M. Buffon, whose text we have copied, because it is contrary to what M. de Pauw writes against the climate of America, and to Buffon himself in many other places.

"If the large and fierce animals, says Clavigero, are natives of temperate climates, and small and tranquil animals of other climes, as M. Buffon has here established; if mildness of climate influences the disposition and customs of animals, M. de Pauw does not well deduce the malignity of the climate of America from the smaller size and less fierceness of its animals; he ought rather to have deduced the gentleness and sweetness of its climate from this antecedent. If, on the contrary, the smaller size and less fierceness of the American animals, with respect to those of the old continent, are a proof of their degeneracy, arising from the malignity of the clime, as M. de Pauw would have it, we ought in like manner to argue the malignity of the climate of Europe from the smaller size and less fierceness of its animals, compared with those of Africa. If a philosopher of the country of Guinea should undertake to work in imitation of M. de Pauw, with this title, "Recherches Philosophiques sur les Europeens," he might avail himself of the same argument which M. de Pauw uses, to demonstrate the malignity of the climate of Europe, and the advantages of that of Africa. The climate of Europe he would say, is very unfavourable to the production of quadrupeds, which are found incomparably smaller, and more cowardly than ours. What are the horse and the ox, the largest of its animals, compared with our elephants, our rhinoceroses, our serpents, and our camels? What are its lizards, either in size or irrepidity, compared with our crocodiles? Its wolves, its bears, the most dreadful of its wild beasts, when beside our lions and tigers? Its eagles, its vultures, and cranes, if compared with our ostriches, appear only like hens.

As to the enormous size and prodigious multiplication of the insects and other noxious animals, "The not more infested than other countries with insects and noxious animals." America, the surface of the earth (says M. de Pauw), infected by putrefaction, was over-run with lizards, serpents, reptiles, and insects monstros for size, and the activity of their poison, which they drew from the copious juices of this uncultivated soil, that was corrupted and abandoned to itself, where the nutritive juice became sharpe, the milk in the breast of animals which do not exercise the virtue of propagation. Caterpillars, ants, butterflies, beetles, spiders, frogs, and toads, were for the most part of an enormous corpulence in their species, and multiplied beyond what can be imagined.

Panama is infested with serpents, Carthagena with clouds of enormous bats, Porto-bello with toads, Surinam with kakerlucks or earwachsen, Gaudaloupe, and the other colonies of these islands, with beetles, Quito with niguas or chegoes, and Lima with lice and bugs. The ancient kings of Mexico, and the emperors of Peru, found no other means of ridding their subjects of those insects which fed upon them, than the imposition of an annual tribute of a certain quantity of lice. Ferdinand Cortes found bags full of them in the palace of Montezena." But this argument, exaggerated as it is, proves nothing against the climate of America in general, much less against that of Mexico. There being some lands in America, in which, on account of their heat, their humidity, or want of inhabitants, large insects are found, and excessively multiplied, will prove at most, that in some places the surface of the earth is infested, as he says, with putrefaction; but not that the soil of Mexico, or that of all America, is flinking, uncultivated, vitiated, and abandoned to itself. If such a deduction were just, M. de Pauw might also say, that the foil of the old continent is barren and fettled; as in many countries of it there are prodigious multitudes of monstrous insects, noxious reptiles, and vile animals, as in the Philippine Isles, in many of those of the Indian archipelago, in several countries of the south of Asia, in many of Africa, and even in some of Europe. The Philippine Isles are infested with enormous ants and monstrous butterflies; Japan with scorpions; South of Asia and Africa with serpents; Egypt with asps; Guinea and Ethiopia with armies of ants; Holland with field-rats; Ukraine with toads, as M. de Pauw himself affirms. In Italy, the Campania di Roma (although peopleed for many ages), is infested with vipers; Calabria with tarantulas; the shores of the Adriatic sea with clouds of gnats; and even in France, the population of which is so great and so ancient, whose lands are so well cultivated, and whose climate is so celebrated by the French, there appeared,
America. a new species of field-mice, larger than the common kind, called by him *Sarmatus*, which have multiplied exceedingly, to the great damage of the fields. M. Bazin, in his Compendium of the History of Insects, numbers 77 species of bugs, which are all found in Paris and in its neighbourhood. That large capital, as Mr. Bomare says, swarms with these delightful insects. It is true that there are places in America, where the multitude of insects, and filthy vermin, make life irksome; but we do not know that they have arrived to such excess of multiplication as to depopulate any place, at least there cannot be so many examples produced of this cause of depopulation in the new as in the old; but we are attested by Theophrastus, Varro, Pliny, and other authors. The frogs depopulated one place in Gaul, and the locusts another in Africa. One of the Cyclades was depopulated by mice; Amiclas, near to Taracina, by serpents; another in which they made with their teeth, in eating the fruits of the woods, was heard at the distance of two miles. M. de Pauw says, in talking of serpents, "it cannot be affirmed that the new world has shown any serpents larger than those which Mr. Adanson has found in the defects of Africa." The greatest serpent found in Mexico, after a diligent search made by Hernandez, was 18 feet long: but this is not to be compared with that of the Moluccas, which Bomare says is 33 feet in length; nor with the Anaconda of Ceylon, which the same author says is more than 33 feet long; nor with others of Asia and Africa, mentioned by the same author.

With respect to the size of the insects, reptiles, and such animals, M. de Pauw makes use of the testimony of M. Dumont, who, in his Memoirs on Lothiana, says, that the frogs are so large there that they weigh 37 French pounds, and that their horrid croaking imitates the bellowing of cows. But M. de Pauw himself says (in his an answer to Don Fernetty, cap. 17), that all those who have written about Lothiana from Henepin, Le Clerc, and Toni, to Dumont, have contradicted each other, sometimes on one and sometimes on another subject. In fact, neither in the old nor the new continent are there frogs of 37 pounds in weight (see the article *Rana*); but there are in Asia and in Africa serpents, butterflies, ants, and other animals of such monstrous size, that they exceed all those which have been discovered in the New-World. We know very well, that an American historian says, that a certain gigantic species of serpent is to be found in the woods, which attracts men with their breath, and swallows them up; but we know also that several historians, both ancient and modern, report the same extravagant and incredible thing of the serpents of Asia, and even something more. Megadethes, cited by Pliny, said, that there were serpents found in Asia, so large, that they swallowed entire flags and bulls. Metrodorus, cited by the same author, affirms, that in Asia there were serpents which, by their breath, attracted birds, however high they were or quick their flight. Among the moderns, Gemelli, in Vol. V. of his *Giro del Mundo*, when he treats of the animals of the Philippine isles, speaks thus: "There are serpents in these islands of immense size; there is one called *Bato*, very long, which suspends itself by the tail from the trunk of a tree, waits till flags, bears, and also men pass by, in order to attract them with its breath, and devour them at once entirely." From whence it is evident, that this very ancient fable has been common to both continents. Further, it may be asked, in what country of America could M. de Pauw find ants to equal those of the Philippine isles called *Sthlaum*, respecting which Her-
three other quarters of the world. In their physical
history, however, the greatest peculiarity in the Am-
ericans is their complexion, and the little difference
which is observed, in this respect, throughout the
whole extent of the American continent. In Europe,
and in Asia, the people who inhabit the northern con-
tries are of a fairer complexion than those who dwell
more to the southward. In the torrid zone, both in
Africa and Asia, the natives are entirely black, or the
next thing to it. This, however, must be understood
with some limitation. The people of Lapland, who
inhabit the most northerly part of Europe, are by no
means so fair as the inhabitants of Britain; nor are the
Tartars so fair as the inhabitants of Europe, who lie
under the same parallels of latitude. Nevertheless, a
Laplander is fair when compared with an Abyssinian,
and a Tartar if compared with a native of the Moluc-
sas. — In America, this distinction of colour was
not so distinctly, and so prominently, marked. In the
torrid zone there were no negroes, and in the tempe-
rate and frigid zones there were no white people. Most
of them were of a kind of red copper-colour, which Mr
Forster observed, in the Peferales of Tierra del Fuego,
to have something of a gloss resembling that metal.
It does not appear, however, that this matter has, hither-
to been inquired into with sufficient accuracy. The
inhabitants of the inland parts of South America, in which
that continent is widest, and consequently the in-
fluence of the sun most powerful, have never been
accurately compared with those of Canada, or more
northerly parts, at least as far as we know. Yet this
ought to have been done, and that in many instances
too, before it could be asserted so positively as most
authors do, that there is not the least difference of com-
plexion among the natives of America. Indeed, so many
systems have been formed concerning these singular peo-
ple, that it is very difficult to obtain a true know-
ledge of the most simple facts, even from the best
and most unprejudiced writers. — If we may believe
the Abbé Raynal the Californians are swarthy rather than the
Mexicans; and so positive is he in this opinion, that he
gives a reason for it. — 'This difference of colour,' says
he, 'proves, that the civilized life of society subverts,
or totally changes, the order and laws of nature, since
we find, under the same temperature, savage people that
are blacker than the civilized nations of the torrid
zone.' — On the other hand, Dr Robertson classes all
the inhabitants of Spanish America together with re-
gard to colour, whether they are civilized or uncivil-
ized; and when he speaks of California, takes no notice
of any peculiarity in their colour more than others. —
The general appearance of the indigenous Americans
in various districts is thus described by the chevalier
Pinto: — 'They are all of a copper colour, with some di-
versity of shade, not in proportion to their distance from the
Equator, but according to the degree of elevation of
the territory in which they reside. Those who live in a
high country are fairer than those in the lower low
lands on the coast. Their face is round; farther re-
moved, perhaps, than that of any people, from an oval
shape. Their fore-head is small; the extremity of their
ears far from the face; their lips thick; their nose flat;
their eyes black, or of a chestnut colour, small, but ca-
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the vast regions extending to the north, as the ornaments of dress among the most polished nations. The buisiness itself they call Matather, and they do not fail to apply all their talents and industry to accomplish it in the most finished manner. No lady of the greatest fashion ever confined her mirror with more anxiety, than the Indians do while painting their bodies. The colours are applied with the utmost accuracy and dexterity. Upon the eye-lids, precisely at the root of the eye-lashes, they draw two lines as fine as the smallest thread; the same upon the lips, the openings of the nostrils, the eye-brows, and the ears; of which last they even follow all the inflexions and irregularities. As to the rest of the face, they distribute various figures, in all which the red predominates, and the other colours are allotted so as to throw it out to the best advantage. The neck also receives its proper ornaments; a thick coat of vermilion commonly distinguishes the cheeks. Five or six hours are requisite for accomplishing all this with the nicety which they affect. As their first attempts do not always succeed to their wish, they efface them, and begin anew upon a better plan. Neither is more faithfulness in her choice of ornament, none more vain when the important adjutment is finished. Their delight and self-satisfaction are then so great, that the mirror is hardly ever laid down. An Indian, Matather, to his mind, is the vainest of all the human species. The other parts of the body are left in their natural state, and, excepting what is called cachecul, they go entirely naked.

Such of them as have made themselves eminent for bravery, or other qualifications, are distinguished by figures painted on their bodies. They introduce the colours by making punctures on their skin, and the extent of surface which this ornament covers is proportioned to the exploits they have performed. Some paint only their arms, others both their arms and legs; others again their thighs, while those who have attained the summit of warlike renown, have their bodies painted from the waist upwards. This is the heraldry of the Indians; the devices of which are probably more exactly adjusted to the merits of the persons who bear them, than those of more civilized countries.

Besides these ornaments, the warriors also carry plumes of feathers on their heads, their arms, and ancles. These likewise are tokens of valour, and none but such as have been thus distinguished may wear them.

The propensity to indolence is equal among all the tribes of Indians, civilized or savage. The only employment of those who have preferred their independence is hunting and fishing. In some districts the women exercise a little agriculture, in raising Indian corn and potatoes, of which they form a species of aliment, by bruiting them together; they also prepare the ordinary beverage in use among them, taking care, at the same time, of the children, of whom the fathers take no charge.

The female Indians of all the conquered regions of South America practice what is called the ara or (a word which among them signifies elevation). It consists in throwing forward the hair from the crown of the head upon the brow, and cutting it round from the ears to above the eye; so that the forehead and eye-brows are entirely covered. The same custom takes place in the Northern countries. The female inhabitants of both regions tie the rest of their hair behind, so exactly in the same fashion, that it might be supposed the effect of mutual imitation. This however being impossible, from the vast distance that separates them, is thought to counteract the supposition of the whole of America being originally planted with one race of people.

This custom does not take place among the males. Those of the higher parts of Peru wear long and flowing hair, which they reckon a great ornament. In the lower parts of the same country they cut it short, on account of the heat of the climate; a circumstance in which they imitate the Spaniards. The inhabitants of Louisiana pluck out their hair by the root, from the crown of the head forwards, in order to obtain a large forehead, otherwise denied them by nature. The rest of their hair they cut as short as possible, to prevent their enemies from seizing them by it in battle, and also to prevent them from easily getting their scalp, should they fall into their hands as prisoners.

According to Don Ulloa, the whole race of the American Indians is distinguished by an uncommon thickness of skin, and by an hardness of their fibres; circumstances which, in the opinion of this learned Spanish writer, contribute to that insensibility to bodily pain for which these singular people are so remarkable. Our author adds an instance in support of this insensibility, in the Americans, in the case of an Indian who was under the necessity of submitting to be cut for the stone. This operation, it is well known, seldom lasts above four or five minutes. Unfavourable circumstances, in his cafe, prolonged it to the uncommon period of 27 minutes. Yet, all this time, the patient gave no tokens of the extreme pain, commonly attended to such operations. He complained only as a person does who feels some slight uneasiness. At last the stone was extracted. Two days after he expressed a desire for food, and on the eighth day from the operation he quitted his bed, free from pain, although the wound was not yet thoroughly closed. The fame want of sensibility, he says, is observed in cases of fractures, wounds, and other accidents of a similar nature. In all these cases their cure is easily effected, and they seem to suffer less pain than any other race of men. The skulls which have been taken up in their ancient burying-grounds are of a greater thickness than that of any bones which is commonly found to be; being from six to seven lines from the outer to the inner peripheries.

It is natural to infer from hence, says Ulloa, that their comparative insensibility to pain is owing to a coufer and stonger organization, than that of other nations. The cave with which they endure the severities of climate is, he thinks, another proof of this. The inhabitants of the higher parts of Peru live amidst perpetual frost and snow. Although their clothing is very light, they support this inclement temperature, without the least inconvenience. Habit, it is to be confessed, may contribute a good deal to this, but much also is to be ascribed to the compact texture of their skin, which defends them from the impression of cold through their pores. We must confess, however, notwithstanding the affections and conjectures of an author so respectable as Don Ulloa, that we are not very confident that either the skins, or the skulls of the Americans are thicker than the skins and skulls of many other nations of mankind. But we do not wish, in this place,
to expatiate on this subject, which can only be reduced to certainty by the investigations of the anatomists, or naturalists.

The northern Indians resemble them in this respect.

The utmost rigours of the winter season do not prevent them from following the chase almost naked. It is true, they wear a kind of woolen cloak, or sometimes the skin of a wild beast, upon their shoulders; but besides that it covers only a small part of their body, it would appear that they use it rather for ornament than warmth. In fact, they wear it indifferently, in the severities of winter and in the full treets of summer, when neither Europeans nor Negroes can suffer any but the lightest clothing. They even frequently throw aside this cloak when they go a-hunting, that it may not embarrass them in traversing their forests, where they say the thorns and undergrowth would take hold of it; while, on the contrary, they slide smoothly over the surface of their naked bodies. At all times they go with their heads uncovered, without suffering the least inconvenience, either from the cold, or from those coups de soleil, which in Louisiana are so often fatal to the inhabitants of other climates.

The Indians of South America distinguish themselves by modern dress, in which they affect various tawes. Those of the high country, and of the valleys in Peru, dress partly in the Spanish fashion. Instead of hats they wear bonnets of coarse double cloth, the weight of which neither seems to inconvenience them when they go to warmer climates nor does the accidental want of them seem to be felt in situations where the most piercing cold reigns. Their legs and feet are always bare, if we except a sort of sandals made of the skins of oxen. The inhabitants of South America, compared with those of North America, are described as generally more feele in their frame; less vigorous in the efforts of their mind; of gentler dispositions more addicted to pleasure, and funk in idleness. This, however, is not universally the case. Many of their nations are, as intrepid and enterprising as any in the world. Among the tribes on the banks of the Oronooko, if a warrior aspires to the post of captain, his probation begins with a long fall, more rigid than any ever observed by the most abstemious hermit. At the close of this the chiefs assemble; and each gives him three lashes with a large whip, applied so vigorously, that his body is almost fayed. If he betrays the least symptom of impatience, or even of sensibility, he is disgraced forever, and is rejected as unworthy of the honour. After some interval, his constancy is proved by a more exhausting trial. He is laid in his hammock with his hands bound fast; and an innumerable multitude of venomous ants, whose bite occasions a violent pain and inflammation, are thrown upon him. The judges of his merit stand around the hammock; and whilst these cruel insects fasten upon the most sensible parts of his body, a figh, a groan, or an involuntary motion expressive of what he suffers, would exclude him from the dignity of which he is ambitious. Even after this evidence, his fortitude is not deemed to be sufficiently ascertained, till he has food another trial more severe, if possible, than the former. He is again suspended in his hammock; and covered with the leaves of the palmetto. A fire of flinking herbs is kindled underneath, so as he may feel its heat, and be involved in smoke. Though scorched and almost suffocated, he must continue to endure this with the same patient incontinence. Many perils in this essay of their firmness and courage; but such as go through it with applause, receive the insignia of their new dignity with much solemnity, and are ever after regarded as leaders of approved resolution, whose behaviour, in the most trying situations, will do honour to their country. In North America the previous trial of a warrior is neither so formal nor so severe: Though, even there, before a youth is permitted to bear arms, his patience and fortitude are proved by blows, by fire, and by insulfs, more intolerable to a haughty spirit than either.

Of the manners and customs of the North Americans more particularly, the following is the most consistent account that can be collected from the best informed and most impartial writers.

When the Europeans first arrived in America, they found the Indians quite naked, except those parts which even the most uncivilized people usually conceal. Since that time, however, they generally use a coarse blanket, which they buy of the neighbouring planters.

Their huts or cabins are made of stakes of wood driven into the ground, and covered with branches of trees or reeds. They lay on the floor either on mats or the skins of wild-beasts. Their dishes are of timber, but their spoons are made of the skulls of wild oxen, and their knives of flint. A kettle and a large plate constitute almost the whole utensils of the family. Their diet consists chiefly in what they procure by hunting; and sagamite, or potage, is likewise one of their most common kinds of food. The most honourable furniture amongst them is a collection of the scalps of their enemies; with those they ornament their huts, which are esteemed in proportion to the number of this sort of spoils.

The character of the Indians is altogether founded upon their circumstances and way of life. A people who are constantly employed in procuring the means of a precarious subsistence, who live by hunting the wild animals, and who are generally engaged in war with their neighbours, cannot be supposed to enjoy much gaiety of temper, or a high flow of spirits. The Indians therefore are in general grave even to fadness; they have nothing of that giddy vivacity peculiar to markable fome nations of Europe, and they despise it. Their behaviour to those about them is regular, modest, and respectful. Ignorant of the arts of amusement, of which that of saying tribes agreeably is one of the most considerabfe, they seldom speak but when they have something important to observe; and all their actions, words, and even looks, are attended with some meaning. This is extremely natural to men who are almost continually engaged in pursuits, which to them are of the highest importance. Their sublimate depends entirely on what they procure with their hands; and their lives, their honour, and every thing dear to them, may be lost by the smallest inattention to the designs of their enemies. As they have no particular object to attach them to one place rather than another, they go wherever they expect to find the necessaries of life in greatest abundance. Cities, which are the effect of agriculture and arts, they have none. The different tribes
tribles or nations, are, for the same reason, extremely small, when compared with civilized societies, in which industry, arts, agriculture, and commerce, have united a vast number of individuals, whom a complicated luxury renders useful to one another. These small tribes live at an immense distance; they are separated by a desert frontier, and hid in the bosom of impenetrable and almost boundless forests.

There is established in each society a certain species of government, which prevails over the whole continent of America, with exceeding little variation; because over the whole of this continent the manners and way of life are nearly similar and uniform. Without arts, riches, or luxury, the great instruments of subjection in polished societies, an American has no method by which he can render himself considerate among his companions, but by inferiority in personal qualities of body or mind. But, as nature has not been very lavish in her personal distinctions, where all enjoy the same education, all are pretty much upon an equality, and will desire to remain so. Liberty, therefore, is the prevalent passion of the Americans; and their government, under the influence of this sentiment, is, perhaps, better secured than by the wisest political regulations. They are very far, however, from desiring all sorts of authority; they are attentive to the voice of wisdom, which experience has conferred on the aged, and they enlist under the banners of the chief in whose valour and military address they have learned to repose a just and merited confidence. In every society, therefore, there is to be considered the power of the chiefs and of the elders. Among these tribes which are most engaged in war, the power of the chief is, naturally, predominant; because the idea of having a military leader was the first source of his superiority, and the continual exigencies of the state requiring such a leader, will continue to support, and even to enhance it. His power, however, is rather persuasive than coercive; he is reverenced as a father, rather than feared as a monarch. He has no guards, no prisons, no officers of justice, and one act of ill-judged violence would pull him from his humble throne. The elders in the other form of government which may be considered as a mild and nominal arbitrariness, have no more power. In most countries, therefore, age alone is sufficient for acquiring respect, influence, and authority. It is age which teaches experience, and experience is the only source of knowledge among a barbarous people. Among those persons business is conducted with the utmost simplicity, and which may recall to those who are acquainted with antiquity, a picture of the most early ages. The heads of families meet together in a house, or cabin appointed for the purpose. Here the business is discussed; and here those of the nation, distinguished for their eloquence or wisdom, have an opportunity of displaying their talents. Their orators, like those of Homer, express themselves in a bold figurative style, stronger than refined, or rather softened, nations can well bear, and with gestures equally violent, but often extremely natural and expressive. When the business is over, and they happen to be well provided with food, they appoint a feast upon the occasion, of which almost the whole nation partakes. The feast is accompanied with a song, in which the real or fabulous exploits of their forefathers are celebrated. They have dances too, though, like those of the Greeks and Romans, they are chiefly of the military kind; and their music and dancing accompany every feast.

To assist their memory, they have belts of small Wampum shells, or beads, of different colours, each representing a particular object, which is marked by their colour and arrangement. At the conclusion of every subject on which they discourse, when they treat with a foreign state, they deliver one of those belts; for if this ceremony should be omitted, all that they have paid passes for nothing. Those belts are carefully deposited in each town, as the public records of the nation; and to them they occasionally have recourse, when any public contest happens with a neighbouring tribe. Of late, as the materials of which those belts are made, have become scarce, they often give some skin in place of the wampum (the name of the beads), and receive in return presents of a more valuable kind from the commissioners; for they never consider a treaty as of any weight, unless every article in it be ratified by such a gratification.

It often happens, that those different tribes or nations, scattered as they are, at an immense distance from one another, meet in their excursions after prey. If there subsists no animosity between them, which seldom is the case, they behave in the most friendly and courteous manner; but if they happen to be in a state of war, or if there has been no previous intercourse between them, all who are not friends are deemed enemies, and they fight with the most savage fury.

If we except hunting and fishing, war is the principal employment of the Indian men: almost every other concern, but in particular the little agriculture which they enjoy, is configned to the women. The most common motive of the Americans for entering into war, when it does not arise from an accidental rencontre, or interference, is either to revenge themselves for the death of some lost friends, or to acquire prisoners, who may assist them in their hunting, and whom they adopt into their society. These wars are either undertaken by some private adventurers, or at the instance of the whole community. In the latter case, all the young men who are disposed to go out to battle (for no one is compelled contrary to his inclination), give a bit of wood to the chief, as a token of their design to accompany him; for every thing among these people is transacted with great deal of ceremony and with many forms. The chief who is to conduct them seeks several solemn days, during which he converses with no one, and sits before his fires and obeys the dreams which he desires to observe his dreams; which the foresight natural to savages generally renders as favourable as he could desire. A variety of other superstitious and ceremonies are observed. One of the most hideous is setting the war-kettle on the fire, as an emblem that they are going out to devour their enemies; which, among these nations, is probable, was formerly the case, since they still continue to express it in clear terms, and use an emblem significant of the ancient usage. Then they dispatch a porcelain, or large shell, to their allies, inviting them to come along, and drink the blood of their enemies. For with the Americans, as with the Greeks of old, "A generous friendship no cold medium knows; But with one love, with one repentment, glows."
They think that those in their alliance must not only adopt their enmities, but that they must also have their resentment wound up to the same pitch with themselves. And, indeed, no people carry their friendships or their resentments so far as they do; and this is what should be expected from their peculiar circumstances: that principle in human nature which is the spring of the social affections, acts with so much the greater force the more it is restrained. The Americans, who live in small societies, who see few objects and few persons, become wonderfully attached to those objects and persons, and cannot be deprived of them without feeling themselves miserable. Their ideas are too confined to enable them to entertain just sentiments of humanity, or universal benevolence. But this very circumstance, while it makes them cruel and savage to an incredible degree, towards those with whom they are at war, adds a new force to their particular friendships, and to the common tie which unites the members of the same tribe, or of those different tribes which are in alliance with one another. Without attending to this reflection, some facts we are going to relate will excite our wonder without informing our reason, and we would be bewildered in a number of particulars, seemingly opposite to one another, without being sensible of the general cause from which they proceed.

Having finished all the ceremonies previous to the war, and the day appointed for their setting out on the expedition being arrived, they take leave of their friends, and exchange their clothes, or whatever war, and the day appointed for their setting out on their fine apparel and vegetables they have, in token of mutual friendship; after they deliver them all their finery, and putting on their worst clothes, proceed on their expedition. When they come up to their women, who lead, bear, otter, wolf, tortoise, and eagle; and by having their perceptions sharpened by keen necessity, and living, in every respect, according to nature, their external senses have a degree of acuteness which, at first view, appears incredible. They can trace out their enemies, at an immense distance, by the smoke of their fires, which they smelt, and by the tracks of their feet upon the ground, imperceptible to an European eye, but which they can count and distinguish with the utmost facility. It is said, they can even distinguish the different nations with whom they are acquainted, and can determine the precise time when they passed, where an European could not, with all his glances, distinguishing footsteps at all. These circumstances, however, are of less importance, because their savage enemies are equally well acquainted with them. When they go out, therefore, they take care to avoid making use of anything by which they might run the danger of a discovery. They light no fire to warm themselves, or to prepare their victuals: they lie close to the ground all day, and travel only in the night; and marching along in files, he that closes the rear diligently covers with leaves the tracks of the ground among the withered herbs and leaves, which their faces are painted to resemble. They paint off or pull out all their hair, except a spot about the breadth of two English crown-pieces, near the top of their heads, and entirely destroy their eye-brows. The lock left upon their heads is divided into several parcels, each of which is stiffened and adorned with wampum, heads, and feathers of various kinds, the whole being twisted into a form much resembling the modern pompon. Their heads are painted red down to the eye-brows, and sprinkled over with white down. The gristles of their ears are split almost quite round, and diffused with wires or splinters, so as to meet and tie together on the nape of the neck. These are, also, hung with ornaments, and, generally, bear the representation of some bird, or beast. Their noses are likewise bored and hung with trinkets of beads, and their faces painted, with various colours, so as to make an awful appearance. Their breasts are adorned with a gorget, or medal, of brass, copper, or some other metal; and that dreadful weapon the scalping-knife hangs by a string from the neck.

The great qualities of an Indian war are vigilance and attention, to give and avoid a surpriz; and, indeed, in these they are superior to all nations in the world. Accustomed to continual wandering in the forests; having their perceptions sharpened by keen necessity, and living, in every respect, according to nature, their external senses have a degree of acuteness which, at first view, appears incredible. They can trace out their enemies, at an immense distance, by the smoke of their fires, which they smelt, and by the tracks of their feet upon the ground, imperceptible to an European eye, but which they can count and distinguishing footsteps at all. These circumstances, however, are of less importance, because their savage enemies are equally well acquainted with them. When they go out, therefore, they take care to avoid making use of anything by which they might run the danger of a discovery. They light no fire to warm themselves, or to prepare their victuals: they lie close to the ground all day, and travel only in the night; and marching along in files, he that closes the rear diligently covers with leaves the tracks of the ground among the withered herbs and leaves, which their faces are painted to resemble. They paint off or pull out all their hair, except a spot about the breadth of two English crown-pieces, near the top of their heads, and entirely destroy their eye-brows. The lock left upon their heads is divided into several parcels, each of which is stiffened and adorned with wampum, heads, and feathers of various kinds, the whole being twisted into a form much resembling the modern pompon. Their heads are painted red down to the eye-brows, and sprinkled over with white down. The gristles of their ears are split almost quite round, and diffused with wires or splinters, so as to meet and tie together on the nape of the neck. These are, also, hung with ornaments, and, generally, bear the representation of some bird, or beast. Their noses are likewise bored and hung with trinkets of beads, and their faces painted, with various colours, so as to make an awful appearance. Their breasts are adorned with a gorget, or medal, of brass, copper, or some other metal; and that dreadful weapon the scalping-knife hangs by a string from the neck.

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the cottage, were, accord-

ing to the elders, a circum-
stantial account of the

mourn their own village; a

men, who have fallen, the

happiness of the survivors,

shrieks come out to

to the people; and as he

mentions the names of those

who have fallen, the

men, too, join in these cries,

as according as each is

most connected with the
deceased by blood or friend-

ship. The last ceremony is the

proclamation of the victory; each in-

dividual then forgets his private misfortunes, and joins

in the triumph of his nation; all tears are wiped from

their eyes, and, by an unaccountable transition,

pafs, in a moment, from the bitterness of sorrow to an

extravagance of joy. But the treatment of the prizon-

ers, whose fate remains all this time undecided, is

what chiefly characterizes the savage.

We have already mentioned the strength of their af-

cections, or resentments. United, as they are, in small

societies, connected, within them selves, by the firmest

ties, their friendly affections, which glow with the

most intense warmth within the walls of their own vil-

lage, seldom extend beyond them. They feel nothing

for the enemies of their nation; and their resentment

easily extended, from the individual who has injured

them, to all others of the same tribe. The prizon-

ers, who have themselves the same feelings, know the

intentions of their conquerors, and are prepared for them.

The person who has taken the captive attends him to

the cottage, where, according to the distribution made

by the elders, he is to be delivered to supply the loss of a

citizen. If those who receive him have no affection for

him, he is weakened by war or other accidents, they at-}

tend the captive into the family, of which he becomes a

member. But if they have no occasion for him, or their

resentment for the loss of their friends is too high to

endure the sight of any connected with those who

were concerned in it, they sentence him to death.

All those who have met with the same severe sentence

being collected, the whole nation is assembled at the

execution, as for some great solemnity. A scaffold is

erected, and the prisioners are tied to the stake, where

they commence their death-song, and prepare for the

enjoying scene of cruelty with the most unfortified
courage. Their enemies, on the other side, are deter-

mined to put it to the proof, by the most refined and ex-

quisite tortures. They begin at the extremity of his

body, and, gradually, approach the more vital parts.

One plucks out his nails by the roots, one by one;

another takes a finger into his mouth, and tears off the

flesh with his teeth; a third thrusts the finger, mangled

as it is, into the bowl of a pipe made red-hot, which he

smokes like tobacco; then they pound his toes and

fingers to pieces between two stones; they cut circles about

his joints, and gashes in the fleshy parts of his limbs, which

they fear immediately with red-hot irons, cut-
ting, burning, and pinching them, alternately; they

pull off his flesh, thus mangled and roasted, bit by bit,

devouring it with greediness, and smearing their faces

with the blood, in an enthusiasm of horror and fury.

When they have thus torn off the flesh, they twist the

bare nerves and tendons about an iron, tearing and

snapping them, whilst others are employed in pulling

and extending his limbs in every way that can in-
crease the torment. This continues, often, five or six

hours; and sometimes, such is the strength of the sa-

vages, days together. Then they frequently unbind

him, to give a breathing to their fury, to think what

new torments they shall inflict, and to renew the

strength of the sufferer, who, wearied out with such a

variety of unheard-of torments, often falls into a pro-

found a sleep, that they are obliged to apply the fire

to awake him, and renew his sufferings. He is again

fartened to the stake, and again they renew their cru-

ality; they flick him all over with small matches of

wood that easily takes fire, but burns slowly; they con-

tinually run sharp reeds into every part of his body;

they drag out his teeth with pincers, and thrust out his

eyes; and, lastly, after having burned his flesh from

the bones with slow fires; after having so mangled the

body that it is all but one wound; after having mutila-
ted his face in such a manner as to carry nothing hu-

man in it; after having peeled the skin from the head,

and poured a heap of red hot coals or boiling water

over the same skull—thence more mangled the wretch;

who, blind, and staggered with pain and weakness,

assaulted and pelted on every side with clubs and ftones,

now up, now down, falling into their fires at every

step, runs hither and thither, until one of the chiefs,

whether out of compassion, or weary of cruelty, puts an

end to his life with a club or dagger. The body is then

put into a kettle, and this barbarous employment is

successed by a feast as barbarous.

The women, forgetting the human as well as the

female nature, and transformed into something worse

than furies, are falted to furpafs even the men in this scene

of horror; while the principal perffons of the country

round the stake, smoking and looking on, without

the least emotion. What is most extraordinary, the

sufferer himfelf, in the little intervals of his torment,

smokes too, appears unconcerned, and converses with

his torturers about indifferent matters. Indeed, during

the whole time of his execution, there seems a contest

of confcioufness of the faint of the fex, which fhall exceed,

them in inflicting the moft horrid pains, or in enduring them with a firmnefs and confcioufness above human: not a groan, not a figh,

not a diftortion of countenance, escapes him: he pol-

ffeis his mind entirely in the midft of his torments:

he recounts his own exploits: he informs them what
cruelties he has inflicted upon their countrymen; and

threatens them with the vengeance that will attend his
death; and, though his reproaches exasperate them to a

perfect madness of rage and fury, he continues his

infults even of their ignorance of the art of torment-
ing, pointing out himself more exquisite methods, and

more fenfible parts of the body to be afflicted. The

women have this part of courage as well as the men;

and it is as rare for an Indian to behave otherwise as

it would be for any European to suffer as an Indian.

Such is the wonderful power of an early infitution,

and a ferocious thirt of glory! "I am brave and in-

trepid.
journey which he is supposed to take. \textit{This solemnity, like every other, is attended with feasting. The funeral being ended, the relations of the deceased confine themselves to their huts, for a considerable time, to indulge their grief. After an interval of some weeks, they visit the grave, repeat their sorrow, new-clothe the remains of the body, and act over again all the formalities of the funeral.}

Among the various tokens of their regard for their deceased friends, the most remarkable is the ceremony which they call the \textit{feast of the dead}, or the \textit{feast of souls}. The day for the ceremony is appointed in the council of their chiefs, who give orders for every thing which may enable them to celebrate it with pomp and magnificence; and the neighbouring nations are invited to partake of the entertainment. At this time, all who have died since the preceding feast of the kind are taken out of their graves. Even those who have been interred at the greatest distance from the villages, are diligently sought for, and conducted to this rendezvous of the dead, which exhibits a scene of horror beyond the power of description. When the feast is concluded, the bodies are dried in the finest skins which can be procured, and after being exposed for some time in this pomp, are again committed to the earth, with great solemnity, which is succeeded by funeral games.

Their taste for war, which forms the chief ingredient in their character, gives a strong bias to their religion. \textit{Arekouo}, or the god of battle, is revered as the great god of the Indians. Him they invoke before they go into the field; and according as his disposition is more or less favourable to them, they conclude they will be more or less successful. Some nations seem to do a kind of homage to the sun, as a symbol, or minister of the beneficence and power of the \textit{Great Spirit}; others pay a similar homage to the moon and planets; among others, there is a number of traditions, relative to the creation of the world and the history of the gods: traditions which resemble the Grecian fables, but which are still more absurd and inconsistent. But religion is not the prevailing character of the Indians; and except when they have some immediate occasion for the affluence of their gods, they pay them no sort of worship. Like all rude nations, however, they are strongly addicted to superstition. They believe in the existence of a number of good and bad genii, or \\textit{spirits}, who interfere in the affairs of mortals, and produce all our happiness, or misery. It is from the evil genii, in particular, that our diseases, they imagine, proceed; and it is to the good genii we are indebted for a cure. The ministers of the genii are the jugglers, who are also the chief physicians among the savages. These jugglers are supposed to be inspired by the good genii, most commonly in their dreams, with the knowledge of future events: they are called in to the affluence of the sick, and are supposed to be informed by the genii whether they will get over the disease, and in what way they must be treated. But these spirits are extremely simple in their system of physic, and, in almost every case, direct the juggler to the same remedy. The patient is included in a narrow cabin, in the midst of which is a stone red-hot; on this they throw water, until he is well soaked with the warm vapour and his own sweat. Then they hurry him from this bagnio, and plunge him suddenly,
AMERICA

Polygamy is practised by some nations, but it is not general. In most, they content themselves with one wife; but a divorce is admitted of in case of adultery. No nation of the Americans is without a regular marriage, in which there are many ceremonies; the principal of which is, the bride’s presenting the bridegroom with a plate of their corn. The women, though before inexperienced, are remarkable for chastity after marriage.

Liberty, in its full extent, being the darling passion of the Indians, their education is directed in such a manner as to cherish this disposition to the utmost. Hence children are never upon any account chastised with blows, and they are seldom even reprimanded. Reason, they say, will guide their children when they come to the use of it, and before that time their faults cannot be very great: but blows might damp their free and martial spirits, by the habit of a servile motive to aotion. When grown up, they experience nothing like command, dependence, or subordination; even strong provocation is indignantly withheld by those who have influence among them. — No man is held in great esteem, unless he has increased the strength of his country with a captive, or adorned his hut with a scalp of one of his enemies.

Controversies among the Indians are few, and quickly decided. When any criminal matter is so flagrant as to become a national concern, it is brought under the jurisdiction of the great council; but in ordinary cases, the crime is either revenged or compromised by the parties concerned. If a murder be committed, the family which has lost a relation prepares to retaliate on that of the offender. They often kill the murderer; and when this happens, the kindred of the last person slain look upon themselves to be as much injured, and to have the same right to vengeance, as the other party. In general, however, the offender absents himself; the friends send compliments of condolence to those of the person who has been murdered. The head of the family, at length, appears with a number of presents, the delivery of which he accompanies with a formal speech. The whole ends, as usual, in mutual feastings, in songs, and in dances. If the murder is committed by one of the same family, or cabin, that cabin has the full right of judgment within itself, either to punish the guilty with death, or to pardon him, or to oblige him to give some recompense to the wife or children of the slain. Instances of such a crime, however, very seldom happen, for their attachment to those of the same family is remarkably strong, and is said to produce such friendships as may vie with the most celebrated in fabulous antiquity.

Such, in general, are the manners and customs of the peculiar Indian nations; but almost every tribe has something peculiar to itself. Among the Hurons, and the Natchez, the dignity of the chief is said to be hereditary, and the right of succession in the female line. When this happens to be extinct, the most respectable matron of the tribe, we are informed, makes choice of whom she pleases to succeed.

The Cheesake are governed by several factions, or chiefs, elected by the different villages; as are also the Creeks, and the Cherokees. The two latter punish adultery in a woman by cutting off her hair, which they will not suffer to grow till the corn is ripe, the next
The Indians on the Lakes are formed into a sort of empire; and the emperor is elected from the chief tribe, which is that of the Ottowaws. This authority is very considerable. A few years ago, the person who held this rank formed a design of uniting all the Indian nations, under his sovereignty; but he miscarried in the bold attempt.

In general, the American Indians live to a great age, although it is not easy to know from themselves the exact number of their years. It was asked of an Indian, who appeared to be extremely old, what age he was? I am above twenty was his reply. Upon asking the question in a different form, by reminding him of certain circumstances, in former times, my macho, said he, spoke to me, when I was young, of the Incas; and he had seen those princes. According to this reply, there must have elapsed, from the date of his macho's (his grandfather's) remembrance to that time, a period of, at least, 232 years. The man who made this reply, appeared to be 120 years of age: for, besides the whiteness of his hair and beard, his body was almost bent to the ground; without, however, showing any other marks of debility, or suffering. This happened in 1764. This longevity, attended in general with uninterrupted health, is thought, by some writers, to be the consequence, in part, of their vacancy from all pursuits of industry, and employment, joined also with the robust texture and constitution of their bodily organs. If the Indians did not destroy one another, in their almost perpetual wars, and if their habits of intoxication were not so universal and irremediable, they would be, of all the races of men who inhabit the globe, the most likely to extend, not only the bounds, but the enjoyments, of animal life to their utmost duration.

Let us now attend to other pictures which have been given of the aboriginal inhabitants of the New-World. The vices and defects of the American Indians have been, by several writers, not only accounted a disgrace, and one of the principal, but also of the evil, and the cause of all the cruelty, they have been accused of, and accounted for. The following anecdote of an Algonquin woman we find adduced as a remarkable proof of their innate thirst of blood. That nation being at war with the Iroquois, she happened to be taken prisoner, and was carried to one of the villages belonging to them. Here she was stripped naked, and her hands and feet bound, with ropes, in one of their cabins. In this condition she remained ten days, the savages sleeping round her every night. The eleventh night, while they were asleep, she found means to disengage one of her hands, with which she immediately freed herself from the ropes, and went to the door. Though she had now an opportunity of escaping unperceived, her revengeful temper could not let her fly to a favourable opportunity of killing one of her enemies. The attempt was manifestly at the hazard of her own life; yet, snatching up a hatchet, she killed the savage that lay next her: and, quitting the cabin, concealed herself in a hollow tree, where she had observed the day before. The groans of the dying person soon alarmed the other savages, and the young ones immediately set out in pursuit of her. Perceiving, from her tree, that they all directed their course one way, and that no savage was near her, she left her sanctuary, and flying by an opposite direction, ran into a forest without being perceived. The second day after this happened, her footsteps were discovered; and they pursued her with such expedition, that the third day she discovered her enemies at her heels. Upon this, she threw herself into a pond of water; and diving among some weeds and bulrushes, she could just breathe above water without being perceived. Her pursuers, after making the most diligent search, were forced to return.—For 35 days this woman held on her course through woods and deserts, without any other sustenance than that which roots and wild berries afforded her. When she came to the river St Lawrence, she made, with her own hands, a kind of wicker raft, on which she crossed it. As she went by the French fort Trois-Rivières, without well knowing where she was, she perceived a canoe full of savages; and fearing they might be Iroquois, ran again into the woods, where she remained till sunset. Continuing her course soon after, the saw Trois-Rivières; and was then discovered by a party whom she knew to be Hurons, a nation in alliance with the Algonquins. She then squatted down, behind a bush, calling out to them that she was not in a condition to be seen, because she was naked. They immediately threw her a blanket, and then conducted her to a fort, where she recounted her story. Personal courage has been her title. In proof of Repoch their plianility, the following incidents are quoted from Charlevoix by lord Kames, in his Sketches of the History of Man. “The fort de Vercheres, in Canada, belonging to the French, was, in the year 1690, attacked by the Iroquois. They approached silently, preparing to scale the palisade, when some musket-shot made them retire. Advancing a second time, they were again repulsed, wondering that they could discover none but a woman, who was seen every where. This was Madame de Vercheres, who appeared as resolute as if supported by a numerous garrison. The hopes of forming a storming-place without delay, occasioned reiterated attacks. After two days they fled they retired, fearing to be intercepted in their retreat. Two years after a party of the same nation appeared before the fort unexpectedly, that a girl of fourteen, daughter of the proprietor, had but time to shut the gate. With the young woman there was not a soul but one raw soldier. She showed herself, with her affiant, sometimes in one place, and sometimes in another; changing her dress frequently, in order to give some appearance of a garrison; and always firing opportunist. The faint-hearted Iroquois desisted without success.

There is no instance, it is said, either of a single Indian facing an individual, of any other nation, in fair and open combat, or of their jointly venturing to try the fate of battle with an equal number of any foes. Even with the greatest superiority of numbers, they dare not meet an open attack. Yet, notwithstanding this want of courage, they are still formidable; nay, it has been known, that a small party of them has routed a much superior body of regular troops: but this can only happen when they have surprized them in the fastnesses of their forrests, where the covert of the wood may conceal them until they take their aim with the utmost certainty. After one such discharge they immediately retreat.
Nor can this odious cruelty and treachery, it is said, be justly ascribed to their submission to a foreign yoke, seeing the same character belongs equally to all the original inhabitants of this vast continent, even to those who have preferred their independence most completely. Certain it is, continues Ulloa, that these people, with the most limited capacities for every thing else, display an astonishing degree of penetration and subtility, with respect to every object that involves treachery, bloodshed, and rapine. As to these, they seem to have been all educated at one school; and a secret, referring to any such plan, no consideration on earth can extort from them.

Their understandings also have been represented as not less contemptible than their manners are gross and brutal. Many nations, it has been said, are neither capable of forming an arrangement for futurity, nor does their solicitude or foresight extend so far. They set no value upon those things of which they are not in some immediate want. In the evening, says father Labrador, when a Carib is going to rest, no consideration will tempt him to sell his hammock; but in the morning he will part with it for the lightest trifle. At the close of winter, a North-American, mindful of what he has suffered from the cold, sets himself with vigour to prepare materials for erecting a comfortable hut, to protect him against the inclemency of the succeeding season; but as soon as the weather becomes mild, he abandons his work, and never thinks of it more till the return of the cold compels him to resume it. In Alleged ingenuity and obedience, and in supposed stupidity.

The fame gross stupidity is alluded to in those Indians who have retained their original liberty. They are never known to fix the dates of any events in their minds, or to trace the succession of circumstances that have arisen from such events. Their imagination takes in only the present, and in that only what intimately concerns themselves. Nor can discipline or instruction overcome this natural defect of apprehension. In fact, the subject to whom the Spanish, who are furnished with curates perpetually occupied in giving them leons of religion and morality, and to whom are related the exploits of the civilized society established among them, are almost as stupid and barbarous as their countrymen who have had no such advantages. The Peruvians, while they lived under the government...
Their vanity and conceit.

Vanity and conceit are said to be blended with their ignorance, and treachery. Notwithstanding all they suffer from Europeans, they still, in fact, confider themselves as a race more superior to their conquerors. This proud belief, arising from a perverted idea of excellence, is universal over the whole known continent of America. They do not think it possible that any people can be so intelligent as themselves. When they are detected in any of their plots, it is their common observation, that the Spaniards, or Viriobusce, want to be as knowing as they are. Those of Louisiana and the countries adjacent, are equally vain of their superior underhanding; confounding that quality with the cunning which they themselves constantly practice. The whole object of their transactions is to over-reach those with whom they deal. Yet though these last themselves, they never forgive the breach of promise on the part of others. While the Europeans seek their amity by presents, they give themselves no concern to secure a reciprocal friendship. Hence, probably, arises their idea, that they must be a superior race of men, in ability and intelligence, to those who are at such pains to court their alliance, and avert their enmity.

Their eloquence despised.

Their natural eloquence has also been decreed. The free tribes of savages who enter into conventions with the Europeans, it is observed, are accustomed to make long, pompous, and, according to their own notions, sublime harangues, but without any method, or connection. The whole is a collection of disjointed metaphors and comparisons. The light, heat, and course of the sun, form the principal topic of their discourse; and these unintelligible reasonings are always accompanied with violent and ridiculous gestures. Numbers, repetitions prolong the oration, which, if not interrupted, would last whole days: at the same time, they meditate very deep for what they are to say, and the whole is but a vain effort to obtain. This prominent faculty of making speeches is also one of the grounds on which they conceive themselves to be superior to the nations of Europe: they imagine that it is their eloquence that procures them the favours they ask. The subject being their language, to reflect in this respect, is diftinguished a civilized Peruvian from an inhabitant of the most savage districts to the northward.

Concerning the stature of the Americans, M. de Stature, says, that although, in general, it is not equal to the stature of the Caftilians, there is but little difference between them. But the Abbé Clavigero evincem, that the Indians who inhabit those countries lying between 9 and 40 degrees of north latitude, which are the limits of the discoveries of the Spaniards, are more than five Parilin feet in height, and that those who do not reach that stature, are as few in number among the Indians as they are among the Spaniards. It besides certain, that many of the American nations, such as the Apachis, the Hiaques, the Pincuses, and Cochis, are at least as tall as the tallest Europeans; and that, in all the vast extent of the New-World, no race of people has been found, except the Equimaux, in the north, and west, and the Yacana-cunines, and Znulais, &c. in the south, so diminutive in stature as the Laplanders, the Samojeds, and Tartars, in the north of the Old-Continente. In this respect, therefore, the inhabitants of the two continents are upon an equality.

Of the shape and character of the Mexican Indians, the Abbé gives a most advantageous description; which he afferts, no one, who reads it, in America, will contradict, unless he views them with the eye of a prejudiced mind. It is true, that Ulloa, in speaking of the Indians of Quito, he had observed that "imperfect people abounded among them that they were either irregularly.
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regularly diminutive, or monstrous in some other respect; that they became either insensible, dumb, or blind; or wanted some limb of their body."

Having, therefore, made some inquiry respecting this singularity of the Quittans, the Abbé found, that such defects were neither caused by what he calls bad humours, nor by the climate, but by the mistaken and blind humanity of their parents, who, in order to free their children from the hardships and toils to which the healthy Indians are subjected by the Spaniards, fix some deformity or weakness upon them, that they may become useless: a circumstance of misery which does not happen in other countries of America, nor in those places of the same kingdom of Quito, where the Indians are under no such oppression. M. de Pauw, and in agreement with him, Dr Robertson, says, that no deformed persons are to be found among the savages of America; because, like the ancient Lacedæmonians, they put to death those children which are born hunch-backed, blind, or defective in any limb; but that in those countries where they are formed into societies, and where the vigilance of their rulers prevents the murder of such infants, the number of their deformed individuals is greater than it is in any country of Europe. This would make an exceedingly good solution of the difficulty if it were true: but if, possibly, there has been in America a tribe of savages who have imitated the barbarous example of the celebrated Lacedæmonians, it is certain that those authors have no grounds to imagine more contrary to the idea we have of beauty, and the perfection of the human frame, than a man, whose skin is black as ink, whose head and face are covered with black wool, instead of hair, whose eyes are yellow and bloody, whose lips are thick and blackish, and whose nose is flat! Such are the inhabitants of a very large portion of Africa, and of many islands of Asia. What men can be more imperfect than those who preceded no more than four feet in stature, whose faces are long and flat, the nose compressed, the irides yellowish black, the eye-lids turned back towards the temples, the cheeks extraordinarily elevated, their mouths monstrously large, their lips thick and prominent, and the lower part of their visages extremely narrow? Such, according to Count de Buffon, are the Laplanders, the Zemblans, the Borandines, the Sancjeds, and the Tartars, in the East. What objects more deformed than men whose faces are too long and wrinkled even in their youth, their noses thick and compressed, their eyes small and sunk, their cheeks very much raised, the upper jaw low, their teeth long and disfigured, eye-brows so thick that they shade their eyes, the eye-lids thick, some bristles on their faces instead of beard, large thighs and small legs? Such is the picture Count de Buffon gives of the Tartars; that is, of those people who, as he says, inhabit a tract of land in Asia 1200 leagues long and upwards, and more than 750 broad. Amongst these, the Calmucks are the most remarkable for their deformity: which is so great, that according to TavNIer, they are the most brutal men of all the universe. Their faces are so broad that there is a space of five or six inches between their eyes, as Count de Buffon himself affirms. In Cali- cut, in Ceylon, and in other countries of India, there is, says Pyrard, and other writers, on those regions, a race of men who have one, or both, of their legs as thick as the body of a man; and that this deformity among them is almost hereditary.

If we were, in like manner, to go through the nations of Asia and Africa, we should hardly find any extensive country where the colour of men is not darker, where there are not greater irregularities observed, and groffer defects to be found in them, than even the penetrating eye of de Pauw could discover in the Americans. The colour of the latter is a good deal clearer than that of almost all the Africans and the inhabitants of South Asia. Even their alleged scantiness of beard is common to the inhabitants of the Philippine-Islands, and of all the Indian-Archipelago, the Mala- nefe, Japanese, Tartars, and many other nations of the Old-Continent. The imperfections of the Americans, however great they may be represented to be,
Their constitution and corporeal abilities.

55. Their constitution and corporeal abilities.

...are, certainly, not comparable with the defects of that immense people, whose character we have sketched, and others whom we omit.

M. de Pauw represents the Americans to be a flexible and defeated set of nations; and, in order to demonstrate the weakness and disorder of their physical constitution, adduces several proofs equally ridiculous and ill-founded, and which it will not be expected we should enumerate. He alleges, among other particulars, that they were overcome in wrestling by all the Europeans, and that they fink under a moderate burden; that by a computation made, 200,000 Americans were found to have perished, in one year, from carrying of baggage. With respect to the first point, the Abbé Clavigero observes, it would be necessary that the experiment of wrestling was made between many individuals of each continent, and that the victory should be attributed by the Americans, as well as by the Europeans. It is not, however, meant to infift, that the Americans are stronger than the Europeans. They may be less strong, without the human species have degenerated in them. The Swifs are stronger than the Italians; and still we do not believe the Italians are degenerated nor do we think, to have perished, from the weight of baggage, were it true, would not convince, so much of the weakness of the Americans, as of the inhumanity of the Europeans. In the same manner that these 200,000 Americans perished, 200,000 Prufians would also have perished, had they been obliged to make a journey of between 300 and 400 miles, with 100 pounds of burden upon their backs: if they had collars of iron about their necks, and were obliged to carry that load over rocks and mountains; if those who became exhausted with fatigue, or wounded their feet so as to impede their progress, had their heads cut off that they might not retard the pace of the rest; and if they were not allowed but a small morsel of bread to enable them to support so severe a toil. Las Casas, from whom M. de Pauw got the account of the 200,000 Americans, who died under the weight of carrying baggage, relates, also, all the abovementioned circumstances. If that author, therefore, is to be credited in the last, he is also to be credited in the first. But, a philosopher who wants to become witness of the several constitutions and corporeal qualities of Europeans, over those of the Americans, would have done better, we think, to suppress facts so opprobrious to the Europeans themselves.

Nothing, in fact, demonstrates so clearly the robustness of the Americans as those various, and lasting, fatigues in which they were continually engaged. M. de Pauw says, that when the New-World was discovered, nothing was to be seen but thick woods; that, at present, there are some lands cultivated, not by the Americans, however, but by the Africans, and Europeans; and that the soil in cultivation is to the soil which is uncultivated as 2000 to 2,000,000. These three assertions the Abbé Clavigero demonstrates to be precisely so many errors. Since the conquest, the Americans alone have been the people who have supported all the fatigues of agriculture in all the vast countries of the continent of South America, and in the greater part of those of North America subject to the crown of Spain. No European is ever to be seen employed in the labours of the field. The Moors, who, in comparison of the Americans, are very few in number in the kingdom of New-Spain, are charged with the culture of the sugarcane, and tobacco, and the making of sugar; but the soil destined for the cultivation of those plants is not, with respect to all the cultivated land of that country, in the proportion of one to two thousand. The Americans are the people who labour on the soil. They are the tillers, the plowers, the weeder, and the reapers of the wheat, of the maize, of the rice, of the beans, and other kinds of grain or pulse, of the cocoa, of the vanilla, of the cotton, of the indigo, and all other plants useful to the subsistence, the clothing, and commerce of those provinces; and without them so little can be done, that in the year 1762, the harvest of wheat was abandoned, in many places, on account of a sickness which prevailed, and prevented the Indians from reaping it. But this is not all; the Americans are they who cut and transport all the necessary timber from the woods, who cut, transport, and work the fomes: who make lime, plaster, and tiles: who construct all the buildings of that kingdom, except a few places where none of them inhabit; who open and repair all the roads, who make the canals and sluices, and clean the cities. They work in many mines of gold, of silver, of copper, &c.: they are the shepherds, herdmen, weavers, potters, basket-makers, bakers, carriers, day-labourers; &c.: in a word, they are the persons who bear all the burden of public labours. These, says our judicious and indignant author, are the employments of the weak, dastardly, and useless Americans; while the vigorous M. de Pauw, and other indefatigable Europeans, are occupied in writing invectives against them.

These labours, which the Indians are continually employed, certainly, attest their healthiness and strength, for if they are able to undergo such fatigues, they can not be diseased, nor have an exhausted flame of blood in their veins, as M. de Pauw infinuates. In order to make it believed that their constitutions are vitiated, he copies whatever he finds written by historians of America, whether true or false, respecting the diseases which reign in some particular countries of that great continent. It is not to be denied, that in some countries in the wide compass of America, men are exposed, more than elsewhere, to the distempers which are occasioned by the tempestuous climate that is peculiar to the continent; but it is certain, according to the assertion of many respectable authors, acquainted with the New-World, that the American countries, for the most part, are healthy; and if the Americans were disposed to retaliate on M. de Pauw, and other European authors, who write as he does, they would have abundant subject of materials to throw discredit on the climate of the Old-Continent, and the constitution of its inhabitants in the endemic distempers which prevail there.

Lastly, the supposed feebleness and unprofitable habit of the Americans do not correspond with the length of their lives. Among those Americans whose great fatigue and excessive toils do not anticipate their death, there are not a few who reach the age of 80, 90, and 100, or more years, as formerly mentioned; and, what is more, without there being observed in them that decay which time commonly produces in the hair, in the teeth, in the skin, and in the mufcles of the human body. This phenomenon, so much admired by the
The Spaniards who reside in Mexico, cannot be ascribed to any other cause than the vigour of their constitutions, the temperance of their diet, and the slowness of their climate. Historians, and other persons who have resided there for many years, report the same thing of other countries of the New-World.

As to the mental qualities of the Americans, M. de Pauw has not been able to discover any other characters than a memory so feeble, that to-day they do not remember what they did yesterday; a capacity so blunt, that they are incapable of thinking or putting their ideas in order; a disposition so cold, that they feel no excitement of love; a daftardly spirit, and a genius that is torpid, and indolent. Many other Europeans, indeed, and what is still more wonderful, many of those children or descendants of Europeans who are born in America, think as M. de Pauw does; some from ignorance, some from want of reflection, and others from hereditary prejudice and prepossession. But all this, and much more, would not be sufficient to invalidate the testimonies of other Europeans, whose authority has a great deal more weight, both because they were men of great judgment, learning and knowledge, of those countries, and because they give their testimony in favour of strangers, against their own countrymen. In particular, Acosta, whose Natural and Moral History even de Pauw commends as an excellent work, employs the whole sixth book in demonstrating the good fate of the Americans, by an explanation of their ancient government, their laws, their histories in paintings and knots, calendars, &c. M. de Pauw thinks the Americans are bestial; Acosta, on the other hand, reprove those persons weak and presumptuous who think them so.

M. de Pauw says, that the most acute Americans were inferior in industry and sagacity to the rudest nations of the Old-Continent; Acosta extols the civil government of the Mexicans above many republics of Europe. M. de Pauw finds, in the moral and political conduct of the Americans, nothing but barbarity, extravagance, and brutality; and Acosta finds there, laws which are admirable, and worthy of being preferred for ever.

M. de Pauw denies them courage, and alleges the conquest of Mexico as a proof of their cowardice. "Cortes (says he) conquered the empire of Mexico with 450 vagabonds, and 15 horses, badly armed; his miserable artillery consisted of six falconets, which would not at the present day be capable of exciting the fears of a forlorned defended by invalids. During his absence, the capital was held in awe by the half of his troops. What men! what events!—It is confirmed by the depositions of all historians, that the Spaniards entered, the first time, into Mexico without making one single discharge of their artillery. If the title of hero is applicable to him who has the disgrace to occasion the death of a great number of rational animals, Ferdinand Cortes might pretend to it; otherwise I do not see what true glory he has acquired by the overthrow of a tottering monarchy, which might have been destroyed, in the same manner, by any other assassin of our continent."

These passages indicate either M. de Pauw's ignorance of the history of the conquest of Mexico, or a wilful fabrication of what would openly contradict his system; since all who have read that history know well, that the conquest of Mexico was not made with 450 men, but with more than 200,000. Cortes himself, to whom it was of more importance than to M. de Pauw to make his bravery conspicuous, and his conquest appear glorious, confesses the excessive number of the allies who were under his command, at the siege of the capital, and combated with more fury against the Mexicans than the Spaniards themselves. According to the account which Cortes gave to the emperor Charles V. the siege of Mexico began with 87 horses, 848 Spanish infantry, armed with guns, cross-bows, swords, and lances, and upwards of 75,000 allies, of Tlacalca, Hueztonico, Cholula, and Chalco, equipped with various sorts of arms; with three large pieces of cannon of iron, 15 small of copper, and 17 brigantines. In the course of the siege were assembled the numerous nations of the Otomies, the Cehouxicas, and Matlazinikas, and the troops of the populous cities of the lakes; so that the army of the bejegiers not only exceeded 200,000, but amounted to 400,000 according to the letter from Cortes; and besides these, 3000 boats and canoes came to their assistance. Did it betray cowardice to have sustained, for full 75 days, the siege of an open city, engaging, daily, with an army so large, and in part provided with arms so superior, and at the same time having to withstand the ravages of famine? Can they merit the charge of cowardice, who, after having lost seven of the eight parts of their city, and about 50,000 citizens, part cut off by the sword, part by famine and sickness, continued to defend themselves until they were furiously assailed in the last hold which was left them? See the article Mexico.

According to M. de Pauw, "the Americans at first Remarks were not believed to be men, but rather fayrens, or blefionate large apes, which might be murdered, without reparation, or reproach. At last, in order to add insult in M. de Pauw.

To the opprobrium of these times, a pope made an original bull, in which he declared, that being dehorous of founding bithoprics in the richest countries in America, it pleased him and the Holy-Spirit, to acknowledge the Americans to be true men; in so far, that without this decision of an Italian, the inhabitants of the New-World would have appeared, even at this day, to the eyes of the faithful, a race of equivocal men. There is no example of such a decision since this globe has been inhabited by men and apes." Upon this passage the Abbé Clavigero animadverts, as being a singular infatation of calumnies and misrepresentation, and gives the following history of the decision alluded to.

"Some of the first Europeans who established themselves in America, not less powerful than avaricious, the famous idlers of enriching themselves to the detriment of the Indians, kept them continually employed, and made use of them as slaves; and, in order to avoid the reproaches, which were made them, by the bishops and misionaries, who inculcated humanity, and the giving liberty to those people to get themselves instructed in religion, that they might do their duties towards the church, and their families, alleged, that the Indians were by nature slaves and incapable of being instructed; and many other falsehoods of which the Chronicler Herrera makes mention against them. Theze vealous ecclesiastics being unable, either by their authority, or preaching, to free those unhappy converts from the tyranny of such masters, had recourse to the Catholic kings, and,
AME [ 556 ]

America. at last, obtained from their justice and clemency, those laws, as favourable to the Americans as honourable to the court of Spain, that compose the Indian code, which were chiefly due to the indefatigable zeal of the bishop de las Casas. On another side, Garces, bishop of Tlaxcala, knowing that those Spaniards were, notwithstanding their perversity, a great respect to the decision of the vicar of Jefus Christ, made application, in the year 1586, to Pope Paul III. by that famous letter, of which we have made mention; representing to him the evils which the Indians suffered from the wicked Chriflians, and praying him to interpose his authority in their behalf. The pope, moved by such heavy remonstrances, dispatched, the next year, the original bull, a faithful copy of which we have here subjoined (a), which was not made, as is manifest, to declare the Americans true men; for such a piece of weakness was very distant from that or any other pope: but solely to support the natural rights of the Americans, against the attempts of their oppressors, and to condemn the injustice and inhumanity of those, who, under the pretence of flapping those people idolatrous, or incapable of being instructed, took from them their property and their liberty, and treated them as slaves and beasts.

But if, at first, the Americans were esteemed savages, nobody can better prove it than Christopher Columbus, their discoverer. Let us hear, there fore, how that celebrated admiral speaks, in his account to Ferdinand and Isabella, of the first savages he saw in the island of Haiti, or Hispaniola. "I swear," he says, "to your majesties, that there is not a better people in the world than theirs, more affectionate, affable, or mild. They love their neighbours as themselves; their language is the sweetest, the softest, and the most cheerful; for they always speak smiling; and although they go naked, let your majesties believe me, their customs are very becoming; and their king, who is served with great majesty, has such engaging manners, that it gives great pleasure to see him, and also to consider the great retentive faculty of that people, and their degree of knowledge, which incites them to ask the causes and the effects of things."

(a) Paulus papa III. univerilis Chrifti Fidelibus prefentes Literas inspeditus Salutem & Apostolicam Benedictionem— "Veritas ipsa, qua nec fallaci, nec fallacere potest, cum Praedicatorum Fidei ad officium praedicationis dedicarit, dixisse dignitatur: Eiusque doni omnibus gentes: omnes, dixit, abique omni decetius, cum omnibus Fidei disciplina capaces exsitan. Quod videns & invicens iiusus humani generis semulius, qui bonos operibus, ut peram, temperat adverfarum, modum excogitavit haecenus inaudita, quo impediret, ne Verbum Dei Gentibus, ut salve fierent, praediceretur: ut quodam eius felicibus commovit, qui fuerit cupiditatem admirabilem cupientes. Occidentales & Meridionales Indos, & alias Gentes, quae temporibus litis ad nostrum notitiam pervenerunt, ut praetextu quod Fidei Catholicae expertes existet, ut bruta animalia, ad nostrae obedientia redigendos esse, paullum afferrere praebunt, & eos in favitum redigent tantis adelphonis illis urgentes, quantis vix bruta animalia illis fervientia urgent. Nosigitur, qui quidem Domini nobis viciss, licet indigni, generalis in terris, & Omnes gregis sui nobis committis, quae extra ejus Ordines sunt, non habeas cognitio ritum & ius, iisque post naves, & laudes, & laudem homines, non solum Christianae Fidei capaces existere, sed, ut nobis innotuet, ad Fidelam Ipsam praeconem securitatem, ac velentem fupers eius congrus remedius provivere, praedictos Indos & omnes alius gentes ad nostram Christi nostrum inter numquem, licet extra fidem Christi existant, suas libertatem & dominium hujusmodi uti, & positi, & gaudere libere, & licetore potest, nec in favitum redigi debe, ac quosque tovs dominium inter se referri integrum & inane, iusque ipsose, & alias Gentes Verbi Dei praedicatione, & exemplum bonae vitae ad diemad fidem Christi invitandos fore. Autoritate Apostolica per praebentes literas decretum, & declarata, non obstatis proemilliis, eeterque contrariis quibuscumque." Datam Romae anno 1537. IV. Non. Ian. Pontificatus nostrorum anno III. Quae, a non alia est quae famosa bolla, per la quale s'è fatto un fi grande fechiamazzo.

"We have had intimate commerce with the Americans (continues the Abbé) have lived, for some years, in a seminary defined for their instruction; saw the erection and progress of the royal college of Guadaloupe founded, in Mexico, by a Mexican Jefuit, for the education of Indian children; had, afterwards, some Indians among our pupils; had particular knowledge of many American rectors, many nobles, and numerous artists; attentively, observed their character, their genius, their disposition, and manner of thinking; and have examined, besides, with the utmost diligence, their ancient history, their religion, their government, their laws, and their customs. After such long experience and study of them, from which we imagine ourselves, enabled to decide, without danger of erring, we declare to M. de Paw, and to all Europe, that the mental qualities of the Americans are not in the least inferior to those of the Europeans; that they are capable of all, even the most abstruse, sciences; and that if equal care was taken of their education, if they were brought up from childhood in seminaries, under good masters, were protected and stimulated by rewards, we should see rise among the Americans, philosophers, mathematicians, and divines, who would rival the first in Europe."

But, although we should suppose, that, in the torrid climates of the New-World, as well as in those of the Old, especially under the additional depression of slavery, there was an inferiority of the mental powers; that they were inferior in the Chilie, and the North-Americans, have discovered higher rudiments of human excellence and ingenuity than have, perhaps, ever been known among tribes in a similar state of society, in any part of the world. M. de Paw affirms, that the Americans were unacquainted with the use of money, and quotes the following well-known passage from Montefquieu: "Imaginate a yourself that, by some accident, you are placed in an unknown country; if you find money there, do not doubt that you are arrived among a polished people." But, if by money we are to understand a piece of metal with the stamp of the prince, or of the public, the want of it in a nation is no token of barbarism. The American employed oxen for money, as the Romans did sheep. The Romans had no coined money till the time of...
Of Servius Titianus, nor had the Persians until the reign of Darius Hystaspes. But, if by money is understood a sign representing the value of merchandise, the Mexicans, and other nations of Anhuac, employed money in their commerce. The cacao, of which they made constant use in the market to purchase whatever they wanted, was employed for this purpose, as falt is in Abyfniain.

It has been affirmed, that stone bridges were unknown in America, when it was first discovered; and that the natives did not know how to form arches. But, these assertions are erroneous. The remains of the ancient palaces of Tezcucco, and, still more, their vapour baths, show the ancient use of arches and of vaults among the Mexicans. But the ignorance of this art would have been no proof of barbarity. Neither the Egyptians nor Babylonians understood the construction of arches.

M. de Pauw affirms, that the palace of Montezuma was nothing else than a hut. But, it is certain, from the affirmation of all the historians of Mexico, that the army under Cortes, consisting of 6,400 men, were all lodged in the palace; and there remained still sufficient room for Montezuma and his attendants.

The advances which the Mexicans had made in the noble science of astronomy, is, perhaps, the most surprising proof of their attention and sagacity: for it appears, from Abbe Clavigero's History, that they not only counted 365 days to the year, but also knew of the excess of about six hours in the solar over the civil year, and remedied the difference, by means of intercalary days. See Astronomy, n° 5.

Of American morality, the following exhortation of a Mexican to his son may serve as a specimen. "My son, who art come into the light from the womb of thy mother like a chicken from the egg, and, like it, are preparing to fly through the world, we know not how long Heaven will grant to us the enjoyment of that precious gem which we possess in thee; but however short the period, endeavour to live exactly, praying God continually to assist thee. He created thee; thou art his property. He is thy father, and loves thee still more than I do; repose in him thy thoughts, and day and night direct thy thoughts to him. Reverence and subdue thy elders, and hold noone in contempt. To the poor and distressed be not dumb, but rather use words of comfort. Honour all persons, particularly thy parents, to whom thou oweliest obedience, respect and service. Guard against imitating the example of those wicked sons, who, like brutes that are deprived of reason, neither reverence their parents, listen to their instruction, nor submit to their correction; because whoever follows their steps will have an unhappy end, will die in a desperate or sullen manner, or will be killed, and devoured by wild beasts."

"Mock not, my son, the aged or the imperfect. Scorn not him whom you see fall into some folly, or transgression, nor make him reproaches; but refrain thyself, and beware lest thou fall into the same error which offends thee in another. Go not where thou art not called, nor interfere in that which does not concern thee. Endeavour to manifest thy good breeding, in all thy words, and actions. In conversation, do not lay thy hands upon another, nor speak too much, nor interrupt or disturb another's discourse. When any one discourses with thee, hear him attentively, and hold thyself in an easy attitude, neither playing with thy feet, nor putting thy mantle to thy mouth, nor spitting too often, nor looking about you here and there, nor rising up frequently if thou art sitting; for such actions are indications of levity and low-breeding."—The father proceeds to mention several particulars which are to be avoided, and concludes—"Steal not, nor give thyself to gaming; otherwise thou wilt be a disgrace to thy parents, whom thou oughtest rather to honour for the education they have given thee. If thou wilt be virtuous, thy example will put the wicked to shame. No more my son; enough hath been said in discharge of the duties of a father. With these counsels I wish to fortify thy mind. Refuse them not, nor act in contradiction to them; for on them thy life, and all thy happiness depend."

As ranging on the same side with the Abbe Clavigero, our countryman Mr. Jefferson deferves particular attention. This gentleman, in his Notes on the State of Virginia, &c. has taken occasion to combat the opinions of Buffon; and seems, in many instances, to have fully refuted them, both by argument and by facts. The French philosopher affirms, "That living nature is active, lively, energetic, in the New-World than in the Old." He affirms, 1. That the animals common to both continents are smaller in America. 2. That those peculiar to the New are on an inferior scale. 3. That those which have been domesticated in both have degenerated in America; and, 4. That it exhibits fewer species of living creatures. The cause of this he attributes to the diminution of heat in America, and to the prevalence of humidity from the extent of its lakes and waters over a prodigious surface. In other words, he affirms that heat is friendly, and moisture adverse, to the production and development of the larger quadrupeds.

The hypothesis that moisture is unfriendly to animal growth, Mr. Jefferson flows to be contradicted by observation, and by experience. It is by the assistance of heat and moisture that vegetables are elaborated from the elements. Accordingly, we find that the more humid climates produce plants in greater perfection than the dry. Vegetables are immediately, or remotely, the food of every animal; and, from the uniform operation of nature's laws, we discern, that, in proportion to the quantity of food, animals are not only multiplied in their numbers, but improved in their size. Of this last opinion is the Count de Buffon himself; in another part of his work: "En general, il parait que les pays un peu froids conviennent mieux à nos beaux que les pays chauds, et qu'ils font d'autant plus gros et plus grands que le climat est plus humide et plus abondant en purures. Les beaux de Danemark, de la Polonie, de l'Ukraine, et de la Tartarie, qui habitent les Cimounes, font les plus grands et c. t. i."

"Here, then, a race of animals, and one of the largest too, has been increased in its dimensions by cold and moisture, in direct opposition to the hypothesis, which supposes that these two circumstances diminish animal bulk, and that it is theircontraries, heat and dryness, which enlarge it. But, to try the question on more general ground, let us take two portions of the earth, Europe and America for instance, sufficiently extensive to give operation to general causes: let us consider the circumstances peculiar to each, and observe their effects.
America, running through the torrid, as well as temperate, zone, has more heat collectively taken, than Europe. But Europe, according to our hypothesis, is the chief. They are equally adapted, then, to animal productions; each being endowed with one of those causes which befriend animal growth, and with one which opposes it. Let us, then, take a comparative view of the quadrupeds of Europe and of America, prefixing them to the eye in three different tables; in one of which shall be enumerated those found in both countries; in a second, those found in one only; in a third, those which have been domesticated in both. To facilitate the comparison, let those of each table be arranged in gradation, according to their sizes, from the greatest to the smallest, so far as their sizes can be conjectured. The weights of the large animal shall be expressed in the English avoirdupois pound and its decimals; those of the smaller in the ounce and its decimals. Those which are marked thus*, are actual weights of particular subjects, deemed among the largest of their species. Those marked thus†, are furnished with judicious persons, well acquainted with the species, and saying, from conjecture only, what the largest individual they had seen would probably have weighed. The other weights are taken from Mefris Buffon and D'Aubenton, and are of such subjects as came casually to their hands for dissection.

"A Comparative View of the Quadrupeds of Europe and of America."

<table>
<thead>
<tr>
<th>Table I. Quadrupeds of both Europe and America.</th>
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<tbody>
<tr>
<td><strong>Europe.</strong></td>
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<td>Mammouth (a)</td>
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<td>Buffalo. Bizon</td>
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<td>Whiate-bear. Ours blanc</td>
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<td>Carribou. Renne</td>
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<td>Bear. Ours</td>
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<td>Elk. Elan. Original, palmed</td>
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<td>Red-deer. Cerf</td>
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<td>Fallow-deer. Daim</td>
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<td>Wolf. Loup</td>
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<td>Roe. Chevreuil</td>
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<td>Glutton. Glouton. Carajou</td>
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<td>Wild-cat. Chat sauvage</td>
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<td>Lynx. Loup cervier</td>
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<td>Beaver. Cafter</td>
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<td>Badger. Blaireau</td>
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<td>Red-fox. Renard</td>
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<td>Grey-fox. Italus</td>
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<td>Otter. Loutre</td>
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<td>Monax. Marmotte</td>
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<td>Vison. Fouine</td>
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<td>Hedgehog. Herisson</td>
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<td>Martin. Marte</td>
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<td>Water-rat. Rat d'eau</td>
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<td>Wefel. Belette</td>
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<td>Flying-squirrel. Polartouch</td>
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<td>Shrew-mouse. Mufcaraigne</td>
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(a) The bones of the Mammoth, or, as it has been called, by Dr Hunter, and by other writers, *Epsoda-Elephant*, appear to be nearly of the same size, and weight, whether they are found in Europe, in Asia, or in America. In these three portions of the earth, the animal, to which these exuviae belonged, was, no doubt, specifically the same. See the article MAMMOUTH.
The result of this view is, that of 26 quadrupeds common to both countries, seven are said to be larger in America, seven of equal size, and 12 not sufficiently examined. So that the first table impeaches the first member of the assumption, that of the animals common to both countries the American are smaller, "Et cela est auense exception." It shows it not juit, in all the latitude in which its author has advanced it, and probably not to such a degree as to found a distinction between the two countries.

Proceeding to the second table, which arranges the animals found in one of the two countries only, M. de Buffon observes, that the tapir, the elephant of America, is but the size of a small cow. To preserve the comparison, Mr. Jefferson states the wild boar; the elephant of Europe, as little more than half that size. He has made an elk, with round or cylindrical horns, an animal of America, and peculiar to it; because he has seen many of them himself, and more of their horns; and because, from the best information, it is certain that, in Virginia, this kind of elk has abounded much, and stil exists, in smaller numbers. He makes the American hare, or rabbit, peculiar, because he believes it to be different from both the European animals of the same denomination, and calls it, therefore, by its Algonquin name, Whabst, to keep it distinct from thefe. Kalm is of the same opinion. The squirrels are denominated from a knowledge derived from daily fight of them, because with that the European appellations and descriptions from irreconcileable. There are the only instances in which Mr. Jefferson departs from the authority of M. de Buffon, in the construction of this table; whom he takes for his ground-work, because he thinks him the best informed of any naturalist who has ever written. The refult is, that there are 18 quadrupeds peculiar to Europe; more than four times as many, to wit, 74, peculiar to America; that the first of these 74, the tapir, the largest of the animals peculiar to America, weights more than the whole column of Europeans; and consequently this second table disproves the second member of the assertion, that the animals peculiar to the New World are on a smaller scale, so far as that assertion relied on European animals for support: and it is in full opposition to the theory which makes the animal volume to depend on the circumstances of heat and moisture.

The third table comprehends those quadrupeds only which are domestic in both countries. That some of these, in some parts of America, have become less than their original flock, is doubtless true: and the reason is very obvious. In a thinly-peopled country, the spontaneous productions of the forest and waste fields are sufficient to support indifferently the domestic animals of the farmer, with a very little aid from him in the feverest and scantient season. He, therefore, finds it more convenient to receive them from the hand of nature in that indifferent state, that to keep up their fize by a care and nourishment which would cost him much labour. If on this low fare, these animals dwindle, it is no more than they do in those parts of Europe where the poverty of the soil, or poverty of the owner, reduces them to the same scanty subsistence. It is the uniform effect of one and the same cause, whether acting on this or that side of the globe. It would be erring therefore against that principle of philosophy, which teaches us to acribe like effects to like causes, should we impute this diminution of size in America to any imbecility or want of uniformity in the operations of nature. It may be affirmed, with truth, that in those countries, and with those individuals, of America, where necessity or curiosity has produced equal care and nourishment in Europe to the nourishment of animals, the horses, cattle, sheep, and hogs of the one continent are as large as those of the other. There are particular instances, well attested, where individuals of America have imported good breeders from England, and have improved their size by care, in the course of some years. And the weights actually known and stated in the third table, will suffice to show, that we may conclude, on probable grounds, that with equal food and care, the climate of America will preserve the races of domestic animals as large as the European flock from which they are derived; and, consequently, that the domestic animals are subject to degeneration from the climate of America, as is probably wrong as the first and second are certainly so.

That the last part of it is erroneous, which affirms, that the species of American quadrupeds are comparatively few, is evident from the tables taken altogether; to which may be added the proofs advanced by the Abbé Clavigero. According to Buffon's latest calculation, in his Époques de la Nature, there are 300 species of quadrupeds;
AME

America.

Draped; and America, though it does not make them live in a third part of the globe, contains, according to Clavigero, not one half of the different species of these animals.

Of the human inhabitants of America, to whom the fame hypothesis of degeneracy is extended, M. Buffon gives the following description: "Though the American savages be nearly of the same stature with men in polished societies; yet this is not a sufficient exception to the general contraction of animated nature throughout the whole continent. In the savage, the organs of generation are small and feeble. He has no hair, no beard, no arbour for the female. Though nimble than the European, because more accustomed to running, his strength is not so great. His sensations are less acute; and yet he is more timid and cowardly. He has no vivacity, no activity of mind. The activity of his body is not so much an exercise or spontaneous motion, as a necessary action produced by want. Destroy his appetite for viands and drink, and you will, at once, annihilate the active principle of all his movements: he remains in stupid repose, on his limbs, or couch, for whole days. It is easy to discover the cause of the scattered life of savages, and of their estrangement from society. They have been refuted the most precise spark of Nature's fire: they have no arbour for women, and of course, no love to mankind. Unacquainted with the most lively and the most tender of all attachments, they areográfous to the same species of his nature cold and languid. Their love to parents and children is extremely weak. The bonds of the most intimate of all societies, that of the family, are feeble; and one family has no attachment to another. Hence no union, no republic, no federal state can take place among them. The physical caufe of love gives rise to the morality of their manners. Their heart is frozen, their society cold, and their empire cruel. They regard their families as servants destined to labour, or at least burden, whom they load unmercifully with the produce of their hunting, and oblige,without pity or gratitude, to perform labours which often exceed their strength. They have few children, and pay little attention to them. Every thing must be referred to the first cause; they are indifferent because they are weak; and this indifference to the sex is the original flaw which disgraces Nature; prevents her from expanding, and by destroying the germs of life, cuts the root of society. Hence, man makes no exception to what has been advanced. Nature, by denying him the faculty of love, has shufled and contracted him more than any other animal."

An humiliating picture, indeed! but which, Mr Jefferson affures us, never was one more unlike the original. M. Buffon grants, that their stature is the same as that of the men of Europe, and he might have admitted, that the Iroquois were larger, and the Le- cupni, or Delawares, taller, than people in Europe generally are. But, he says, their organs of generation are smaller and weaker than those of Europeans: which is not known, at least, to be a fact. And as to their want of heard, this error has been already noticed (n52: fopra).

"They have no arbour for their females." - It is true, they do not indulge those excesses, nor discover that fondness which is customary in Europe; but this is not owing to a defect in nature, but to manners. The soul of the Indian is wholly bent upon war. This is what procures him glory among the men, and makes him the admiration of the women. To this he is educated, from his earliest youth. When he pursues game with ardour, when he bears the fatigue of the chase, when he sustains and suffers patiently hunger and cold; it is not so much for the sake of the game he pursues, as to convince his parents and the council of the nation, that he is fit to be enrolled in the number of the warriors. The songs of the women, the dance of the warriors, the sage counsel of the chiefs, the tales of the old, the triumphal entry of the warriors returning, with success, from battle, and the respect paid to those who distinguish themselves in battle, and in fabricating their enemies; in short, every thing he fears or hears tends to inspire the Indian with an ardent desire for military fame. If a young man were to discover a fondness for women before he has been to war, he would become the contempt of the men, and the scorn and ridicule of the women; or were he to indulge himself with a captive taken in war, and much more were he to offer violence in order to gratify his lust, he would incur indelible disgrace. The seeming frugality of the American, therefore, is the effect of manners, and not a defect of nature. He is neither more defective in ar­ dour, nor impotent with the female, than a white man reduced to the same diet and exercise.

"They raise few children." - They, indeed, raise fewer children than we do; the causes of which are to be found not in a difference of nature, but of circumstance. The women very frequently attending the men in their parties of war and of hunting, child-bearing becomes extremely inconvenient to them. It is said, therefore, that they have learned the practice of procuring abortion by the use of certain vegetables; and that they even tend to prevent conception for a considerable time after. During these parties they are exposed to numerous hazards, to excessive exertions, to the greatest extremities of hunger. Even at their homes, the nation depends for food, through a certain part of every year, on the gleanings of the forest; that is, they experience a famine once in every year. With all animals, if the female be badly fed, or not fed at all, her young perish; and if both male and female be reduced to like want, generation becomes less active; less productive. To the obstacles, then, of want and hazard, which nature has opposed to the multiplication of wild animals, for the purpose of restraining their numbers within certain bounds, those of labour and voluntary abortion are added with the Indian. No wonder, then, if they multiply less than we do. Where food is regularly supplied, a single farm will yield more of cattle than a whole country of forests can of buffa­loes. The same Indian women, when married to white traders, who feed them and their children plentifully and regularly, who exempt them from excessive drudgery, who keep them stationary and unexposed to accident, produce, and raise, as many children as the white women. Influences are known, under these circumstances, of their rearing a dozen children.

Neither do they seem to be "deficient in natural affection." On the contrary their sensibility is keen, sensibility even the warriors weeping most bitterly on the loss of &c. their
Their friendships are strong, and faithful, to the utmost extremity. A remarkable instance of this appeared in the case of the late Col. Byrd, of Virginia, who was sent to the Cheerek nation to transact some business with them. It happened that some of our disorderly people had just killed one or two of that nation. It was therefore proposed in the council of the Cheerek, that Col. Byrd should be put to death in revenge for the loss of their countrymen. Among them was a chief called Sliouee, who on some former occasion, had contracted an acquaintance and friendship with Col. Byrd. He came to him every night, in his tent, and told him not to be afraid, they should not kill him. After many days deliberation, however, the determination was, contrary to Silouee's expectation, that Byrd should be put to death, and some warriors were dispatched as executioners. Silouee attended them; and when they entered the tent, he threw himself between them and Byrd, and said to the warriors, "This man is my friend, before you get at him, you must kill me." On which they returned; and the council repeated the principle so much as to recede from their determination.

That "they are timorous and cowardly" is a character with which there is little reason to charge them, when we recollect the manner in which the Iroquois met Mon.——, who marched into their country; in which the old men, who scorned to fly, or to sur vive the capture of their town, braved death, like the old Romans, in the time of the Gauls, and in which they soon after revenged themselves by facking and destroying Montreal. In short, the Indian is brave, when an enterprise depends on bravery; education with him making the point of honour to confit in the destruction of an enemy by stratagem; and in the preservation of his own person free from injury; or, perhaps this is nature, while it is education which teaches us to honour force more than finesse. He will defend himself against an host of enemies, always choosing to be killed rather than to surrender, though it be to the whites, who, he knows, will treat him well. In other situations also, he meets death with more deliberation; and endures tortures with a firmness unknown almost to religious enthusiasm among us.

Much less are they to be characterized as a people of no vivacity, and who are excited to action or motion only by the calls of hunger and thirst. Their dances, in which they so much delight, and which to a European would be the most severe exercise, fully contradict this; not to mention their fatigue Marches, and the toil they voluntarily and cheerfully undergo in their military expeditions. It is true, that when at home they do not employ themselves in labour or the culture of the soil: but this again, is the effect of customs and manners which have alligned that to the province of the women. But it is said, "they are averse to society and a social life." Can any thing be more inapplicable than this, to a people who always live in towns, or in clans? Or can they be said to have no republicans, who conduct all their affairs in national councils; who pride themselves in their national character; who consider an insult or injury, done to an individual by a stranger, as done to the whole, and resent it accordingly?

To form a just estimate of their genius and mental powers, Mr. Jelfier observes, more talents are wanting, and great allowance is to be made for those circumstances of their situation which call for a display of particular talents only. This done, we shall probably find that the Americans are formed, in mind as well as in body, on the same model with the Homo Faber Europaeus. The principles of their society forbidding all compulsion, they are to be led to duty and to enterprise, personal motives and passions. Hence eloquence in council, bravery and address in war, become the foundations of all confluence with them. To these acquisitions all their faculties are directed. Of their bravery and address in war we have multiplied proofs, because we have been the subjects on which they were exercised. Of their eminence in oratory we have fewer examples, because it is displayed chiefly in their own councils. Some, however, we have of very superior luftre. We may challenge the whole orations of Demosthenes and Cicero, and of any more eminent orator; if Europe has furnished more eminent, to produce a single passage superior to the speech of Logan, a Mingon chief, to Lord Dunmore, when governor of Virginia. The oratory is as follows; of which the authenticity is unquestionable. Hence eloquence in council, bravery and address in war.

In the spring of the year 1774, a robbery and murder were committed on an inhabitant of the frontiers of Virginia by two Indians of the Shawanac tribe. The neighboring whites, according to their custom, undertook to punish this outrage, in a summary way. Colonel Cresap, a man infamous for the many murders he had committed on those much-injured people, collected a party, and proceeded down the Kanawhaw, in quest of vengeance. Unfortunately a canoe of women and children, with one man only, was seen coming from the opposite shore, unarmed, and unsuspecting any hostile attack from the whites. Cresap and his party concealed themselves on the bank of the river; and the moment the canoe reached the shore, fenced out their objects, and, at one fire, killed every person in it. This happened to be the family of Logan, who had long been distinguished as a friend of the whites. This unworthy return provoked his vengeance. He accordingly signaled himself in the war which ensued. In the autumn of the same year, a decisive battle was fought at the mouth of the Great-Kanawhah, between the collected forces of the Shawanees, Mingoes, and Delawares, and a detachment of the Virginia militia. The Indians were defeated, and fled for safety. Logan, however, determined to be seen among the suppliants; but, left the sincerity of a treaty should be distrusted from which so distinguished a chief abstained himself, he went, by a messenger, the following speech, to be delivered to Lord Dunmore:——"I appeal to any white man to say if ever he entered Logan's cabin hungry, and he gave him not meat; if ever he came cold and naked, and he clothed him not. During the course of the last long and bloody war, Logan remained idle in his cabin, an advocate for peace. Such was my love for the whites, that my countrymen pointed as such to the province of the women. But it is said, "they are averse to society and a social life." Can any thing be more inapplicable than this, to a people who always live in towns, or in clans? Or can they be said to have no republicans, who conduct all their affairs in national councils; who pride themselves in their national character; who consider an insult or injury, done to an individual by a stranger, as done to the whole, and resent it accordingly?
The anecdote.

Other anecdotes.

Dilcrlcan and politeness.

... "the veins of any living creature. This called upon us to rejoice at the beams of peace; but do not harbour a thought that mine is the joy of fear. Logan never felt fear. He will not turn on his heel to save his life. We shall mourn for Logan! Not one."

To the preceding anecdotes, in favour of the American character, may be added the following, by Dr Benjamin Franklin.—The Indian men, when young, are hunters and warriors; when old, counsellors; for all their government is by the counsel or advice of the sages. Hence, they generally study oratory; the best speakers having the most influence. The Indian women till the ground, dress the food, nurse and bring up the children, and preferve and hand down to posterity the memory of public transactions. These employments of men and women are accounted natural and honourable. Having few artificial wants, they have abundance of leisure for improvement by conversation and laborious manner of life, compared with theirs, they often visit and trade; and the learning which we value ourselves, they regard as frivolous and useless.

Having frequent occasions to hold public councils, they have acquired great order and decency in conducting them. The old men sit in the foremost rank, the warriors in the next, and the women and children in the hindmost. The business of the women is to take exact notice of what passes; imprint it in their memories, for they have no writing, and communicate it to their children. They are the records of the council, and they preserve tradition of the stipulations in treaties a hundred years back; which, when we compare with our writings, we always find exact. He that would speak, rise. The rest observe a profound silence. When he has finished, and sits down, they leave him five or six minutes to recollect, if he has omitted anything he intended to say, or has anything to add, he may rise again and deliver it. To interrupt another, even in common conversation, is reckoned highly indecent.

The politefns of these favages in conversation is, indeed, carried to excess; since it does not permit them to contradict, or deny, the truth of what is asserted in their presence. By these means, they avoid disputes; but then it becomes difficult to know their minds, or what impression you make upon them. The missionaries, who have attempted to convert them to Christianity, all complain of this, as one of the great difficulties of their mission. The Indians, hear, with patience, the truths of the gospel explained to them, and give their usual tokens of assent and approbation; but this by no means implies conviction: it is mere civility. When any of them come into our towns, our people are apt to crowd round them, gaze upon them, and incommode them when they desire to be private; this they esteem great rudeness, and the effect of the want of instruction in the rules of civility and good manners.

"We have," they say, "as much trouble as you and I, and when we come into your towns, we will for opportunities of looking at you; but for this purpose we hide ourselves behind bushes where you are to a pass, and never intrude ourselves into your company."
The next question which offers itself to our notice, is, Whether the peculiarities of the aboriginal Americans, or the disparity between them and the inhabitants of the Old-World, afford sufficient grounds for determining them, as many eminent writers have done, to be a race of men radically different from all others? In this question, to avoid being tedious, we shall confine ourselves to what has been advanced by Lord Kames; who is of opinion, that there are many different species of men, as well as of other animals; and gives an hypothesis, whereby he pretends his opinion may be maintained in a consistency with Revelation.

"If (says he) the only rule afforded by nature for classing animals can be depended on, there are different races of men as well as of dogs: a mastiff differs not more from a spaniel, than a white man from a negro, or a Laplander from a Dane. And, if we have any faith in Providence, it ought to be so. Plants were created of different kinds, to fit them for different climates; and so were brute animals. Certain it is, that all men are not fitted equally for every climate. There is scarce a climate but what is natural to some men, where they prosper and flourish: and there is not a climate, but where some men degenerate. Doth not then analogy lead us to conclude, that, as there are different climates on the face of this globe, so there are different races of men fitted for these different climates?"

"M. Buffon, from the rule, That animals which can procreate together, and whose progeny can also procreate, are of one species; concludes, that all men are of one race or species; and endeavours to support that favourite opinion, by ascribing to the climate, to food, or to other accidental causes, all the varieties that are found among men. But he is seriously of opinion, that any operation of climate, or of other accidental cause, can account for the copper colour and smooth chin universal among the Americans; the prominence of the pudenda universal among the Hottentot women, or the black nipple no less universal among the female Samoiedes? It is in vain to ascribe to the climate, the low stature of the Equinoctial, the smallness of their feet, the overgrown size of their heads. It is equally in vain to ascribe to climate the low stature of the Laplanders, or their ugly visage. The black colour of negroes, thick lips, flat nose, erifed woolly hair, and rank smell, distinguish them from every other race of men. The Abyssinians, on the contrary, are tall and well made, their complexion a brown olive, features well-proportioned, eyes large and of a sparkling black, thin lips, a nose rather high than flat. There is no such difference of climate between Abyssinia and Negro-land as to produce these striking differences.

"Nor shall our author's ingenious hypothesis concerning the extremities of heat and cold, purchase him impunity with respect to the fallow complexion of the Samoiedes, Laplanders, and Greenlanders. The Finlanders, and northern Norwegians, live in a climate not less cold than that of the people mentioned; and yet are far beyond other Europeans. I say, more, there are many instances of races of people preferring their original colour, in climates very different from their own; but not a single instance of the contrary, as far as I can learn. There have been four complete generations of negroes in Pennsylvania, without any visible change of colour; they continue jet black, as originally. Those who ascribe all to the sun: ought to consider how little probable it is, that the colour it imparts to the parents should be communicated to their infant children who never saw the sun: I should be as soon induced to believe, with a German naturalist, whose name has escaped me, that the negro colour is owing to an ancient custom in Africa, of dyeing the skin black. Let a European, for years, expose himself to the sun, in a hot climate, till he be quite brown; the children will, nevertheless, have the same complexion with those in Europe. From the action of the sun, is it possible to explain, why a negro, like a European, is born with a ruddy skin, which turns jet black, the eighth, or ninth, day?"

Our author next proceeds to draw some arguments for the existence of different races of men, from the various tempers and dispositions of different nations; which he reckons to be specific differences, as well as of colour, stature, &c. Having summed up his evidence, he concludes thus: "Upon summing up the whole particulars, mentioned above, would one hesitate a moment, to adopt the following opinion, were there no counterbalancing evidence, viz. 'That God created many pairs of the human race, differing from each other, both externally and internally; that he fitted those pairs for different climates, and placed each pair in its proper climate; that the peculiarities of the original pairs were preferred entire in their descendants; who, having no affliction but their natural talents, were left to gather knowledge from experience; and, in particular, was left (each tribe) to form a language for itself; that signs were sufficient..."
America. 

sufficient for the original pairs, without any language 
but what nature suggests; and that a language was 
formed gradually, as a tribe increased in numbers, 
and in different occupations, to make speech neces-
sary? But this opinion, however plausible, we are 
not permitted to adopt, being taught a different lesson 
by Scripture, viz., that God created but a single 
pair of the human species. Though we cannot doubt 
the authority of Moses, yet his account of the crea-
tion of man is not a little puzzling, as it seems to 
contradict every one of the facts mentioned above. 
According to that account, different races of men were 
not formed, nor were men formed originally for 
different climates. All men must have spoken the same 
language, viz. That of our first parents. And what of 
all the most contradictory to that account, is the 
savage state: Adam, as Moses informs us, was endued 
by his Maker with an eminent degree of knowledge; 
and he certainly was an excellent preceptor to his chil-
dren and their progeny, among whom he lived many 
generations. Whence then the degeneracy of 
man race to have been divided into different fpecies, at 
the close of each species. That God 

86 His hypo-
theses con-
cerning the 
origin of the 
different 
species.

87 Incom-
plete.

the difficulty will vanish: but if this is his Lordship’s 
interpretation, it is certainly a very singular one.

Before entering upon the consideration of the partic-
ular arguments used by our author for proving the di-
versity of species in the human race, it will be proper 
to lay down the following general principles, which 
may serve as axioms. (1) When we affirm a multi-
plicity of species in the human race, and bring in a 
supernatural cause to solve a natural phenomenon; for 
these species are supposed to be the immediate work of the Deity. (2) No person has a right to call any 
thing the immediate effect of omnipotence, unless by 
express revelation from the Deity, or from a certainty 
that no natural cause is sufficient to produce the effect. The reason is plain. The Deity is invisible, and there 
are many natural causes; when we see an effect, therefore, 
of which the cause does not manifest itself, we 
cannot know whether the immediate cause is the Deity, 
or an invisible natural power. An example of this we 
have in the phenomena of thunder and earthquakes, 
which were often acried immediately to the Deity, 
but were now discovered to be the effects of electricity. 
(3) No person can assert natural causes to be in-
sufficient to produce such and such effects, unless he perfectly 
knows all these causes, and the limits of their power in all possible cases; and this no man has ever 
known, or can know.

By keeping in view these principles, which we hope 
are self-evident, we will easily see Lord Kames’s ar-
guments to consist entirely in a petitio principii. —In 
substance, they are all reduced to this single sentence: 
“Natural philosophers have been, hitherto, unsuccessful 
in their endeavours to account for the differences 
observed among mankind, therefore these differences 
cannot be accounted for from natural causes.”

Lord Kames, however, tells us in the passages al-
ready quoted, that “a mastiff differs not more from a spaniel, than a Laplander from a Dane”: that “it is 
vain to ascribe to climate the low stature of the Lap-
landers, or their ugly visage.” Yet, in a note on the 
word Laplanders, he subjoins, that, “by late accounts 
it appears, that the Laplanders are only degenerated 
Tartars, and that they and the Hungarians originally 
prung from the same breed of men, and from the same 
country.” —The Hungarians are generally handsome 
and well-made, like Danes, or like other people. The 
Laplanders, he tells us, differ as much from them as a 
maiiff from a spaniel. Natural causes, therefore, ac-
cording to Lord Kames himself, may cause two individ-
uals of the same species of mankind differ from each 
other as much as a mastiff does from a spaniel.

While we are treating this subject of colour, it may 
not be amiss to observe, that a very remarkable dif-
ference of colour may accidentally happen to individuals 
of the same species. In the isthmus of Darien, a singu-
lar race of men have been discovered. —They are of 
low stature, of a feeble make, and incapable of endur-
ing fatigue. Their colour is a dead milk white; not 
resembling that of fair people among Europeans, but 
without any blush or sanguine complexion. Their skin 
is covered with a fine hairy down of a chalky white; 
the hair of their heads, their eye-brows, and beard, are of the same hue. Their eyes are of a singular 
form, and so weak, that they can hardly bear the light 

of
of the sun; but they see clearly by moon-light, and are most active and gay in the night. Among the negroes of Africa, as well as the natives of the Indian islands, a small number of those people are produced. They are called Albinos by the Portuguese, and Kackerlakes by the Dutch.

91 Colour no char. specific of diff. spec.

This race of men is not indeed permanent; but it is sufficient to show, that mere colour is by no means the characteristic of a certain species of mankind. The difference of colour in these individuals is undoubtedly owing to a natural cause. To constitute, then, a race of men of this colour, it would only be necessary that this cause, which at present is merely accidental, should become permanent, and we cannot know but it may be so in some parts of the world.

92 Nor nature.

If a difference of colour is no characteristic of a different species of mankind, much less can a difference in nature be thought so. In the southern parts of America, there are said to be a race of men exceeding the common size in height and strength*. This account, however, is doubted by some; but be that as it will, it is certain that the Equinoxes are as much under the common size, as the Patagonians are said to be above it. Nevertheless, we are not to imagine, that either of these are specific differences; seeing the Laplanders and Hungarians are both of the same species, and yet the former are generally almost a foot shorter than the latter; and if a difference of climate, or other accidental causes, can make the people of one country a foot shorter than the common size of mankind, undoubtedly accidental causes of a contrary nature may make those of another country a foot taller than other men.

93 Different causes contr. towards an alteration in colour.

Though the fun has, most undoubtedly, a share in the production of the swarty colour of those nations which are exposed to its influence; yet the manner of living to which people are accustomed; their food, their employment, and many other circumstances, must also contribute a little to a difference of complexion. The more full examination, however, of these several circumstances we refer to for another article. See the article Complexion.

94 Habit capable of affecting the infancy of animals.

It is allowed on all hands, that it is more easy to work a change upon the body of a man, or any other animal, than upon his mind. A man who is naturally choleric, may, indeed, learn to prevent the bad effects of his passion by reason, but the passion itself will remain as immutable as his character—But, to reason in a manner similar to Lord Kames; though a man should be naturally choleric, or subject to any other passion, why should his children be so?—This way of reasoning, however plausible, is by no means conclusive, as will appear from the following passage in Mr Forster's Voyage.

June 9th. "The officers who could not yet relish their last provisions after the refreshments of New Zealand, had ordered their black dog, mentioned p. 135, to be killed: this day, therefore, we dined, for the first time, on a leg of it roasted; which tasted so exactly like mutton, that it was absolutely undistinguishable. In our cold countries, where animal food is so much used, and where to be carnivorous, perhaps, lies in the nature of men, or is indifferably necessary to the preservation of their health and strength, it is strange that there should exist a Jewish aversion to dogs' flesh, when dogs, the most uncleanly of all animals, are eaten without scruple. Nature seems expressly to have intended them for this use, by making their offspring so very numerous, and their increase so quick, and frequent. It may be objected, that the exalted degree of instinct which we observe in our dogs, inspires us with great unwillingness to kill and eat them. But it is owing to the time we spend on the education of dogs, that they acquire those eminent qualities, which attract us so much to them. The natural instincts of our dogs may receive a wonderful improvement; but education must give its assistance, without which the human mind itself, though capable of an immense expansion, remains in a very contracted state. In New-Zealand, and (according to former accounts of voyages) in the tropical isles of the South-Sea, the dogs are the most stupid, dull animals imaginable, and do not seem to have the least advantage in point of sagacity over our sheep, which are commonly made the emblems of fillinets. In the former country they are fed upon fish, in the latter on vegetables, and both these diets may have served to alter their disposition. Education may, perhaps, likewise, grant new instincts: the New-Zealand dogs are fed on the remains of their masters, and that of the bones of other dogs; and the puppies become true cannibals from their birth. We had a young New-Zealand puppy on board, which had certainly had no opportunity of tasting any thing but the mother's milk before we purchased it; however, it eagerly devoured a portion of the flesh and bones of the dog on which we dined to-day; while several others of the European breed, taken on board at the Cape, turned from it without touching it.

"On the 4th of August, a young bitch, of the terrier breed, taken on board at the Cape of Good-Hope, and covered by a Spaniel, brought ten young ones, one of which was dead. The New-Zealand dog mentioned above, which devoured the bones of the roasted dog, now fell upon the dead puppy, and eat of it with a ravenous appetite. This is a proof how far education may go in producing, and propagating, new instincts in animals. European dogs are never fed on the meat of their own species, but rather seem to abhor it. The New-Zealand dogs, in all likelihood, are trained up from their earliest age, to eat the remains of their master's meals: they are, therefore, used to feed upon fish; their own species; and, perhaps, human flesh; and what was only owing to a habit, at first, may have become instinct, by length of time. This was remarkable in our canni­bal dog; for he came on board so young, that he could not have been weaned long enough to have acquired a habit of devouring his own species, and much less of eating human flesh; however, one of our men having cut his finger, held it out to the dog, who fell to greedily, licked it, and then began to bite it."

From this account it appears, that even the instincts of animals are not unchangeable by natural causes; and if these causes are powerful enough to change the dispositions of succeeding generations, much more may we suppose them capable of making any possible alteration in the external appearance.

We are not here necessitated to confine ourseffes to examples of the production of one general character, taken from a mixture of many different
different nations — They were a motley multitude, consisting of various German nations dwelling beyond the Rhine; who, uniting in defence of their common liberty, took thence the name of Frank; the word Frank signifying in their language, as it still does in ours, free. Amongst them the following nations were mentioned, viz. the Achazii, Chamavi, Bructeri, Salii, Frifii, Chauzi, Amfunviri, and Catti. We cannot suppose one character to belong to so many different nations; yet is it certain that the Franks were, nationally, characterized as treacherous. It is in vain, then, to talk of different races of men, either from their colour, size, or prevailing dispositions, seeing we have undeniable proofs that all these may be changed, in the most remarkable manner, by natural causes, without any miraculous interpolation of the Deity.

Of the peopling of America.

The questions which now present themselves to our notice are, From what part of the Old-World America has, most probably, been peopled? — And how was this peopling accomplished? — Few speculations in the history of mankind have been more agitated than these. — Philosophers, and men of learning and ingenuity, have been speculating upon them, ever since the discovery of the American-Islands, by Christopher Columbus. — But notwithstanding all the labours of Acofa, of Grotius, and of many other writers of eminence, the subject still affords an ample field for the researches of the man of science, and for the fancies of the theorist.

Discoveries, long ago made, inform us, that an intercourse between the Old-Continent and America might be carried on, with facility, from the north-west extremities of Europe and the north-east boundaries of Asia. In the ninth century the Norwegians discovered Greenland, and planted a colony there. The communication with that country, was renewed in the last century by Moravian missionaries, in order to propagate their doctrine in that bleak and uncultivated region. By them we are informed that the north-west coast of Greenland is separated from America by a very narrow strait; that at the bottom of the bay it is highly probable that they are united; that the Equinoum of America perfectly resemble the Greenlanders, in their aspect, dress, and mode of living; and that a Moravian vessel, sent to search for Greenland, having visited the country of the Equinoum, found, to his astonishment, that they spoke the same language with the Greenlanders, and were, in every respect, the same people. The tame species of animals, too, are found in the contiguous regions. The bear, the wolf, the fox, the hare, the deer, the roe-buck, the elk, frequent the forests of North-America, as well as those in the north of Europe.

Other discoveries have proved, that if the two continents of Asia and America be separated at all, it is only by a narrow strait. From this part of the Old-Continent, also, inhabitants may have passed into the New; and the resemblance between the Indians of America and the eastern inhabitants of Asia, would induce us to conjecture that they have a common origin.

This is the opinion adopted by Dr Roberton, in his History of America*, where we find it accompanied with the following narrative.

"While those immense regions which fretched easternward from the river Obi to the fca of Kamtchata were unknown, or imperfectly explored, the north-east extremities of our hemisphere were supposed to be so far distant from any part of the New-world, that it was not easy to conceive how any communication should have been carried on between them. But the Ruffians, having subjected the western part of Siberia to their empire, gradually extended their knowledge of that vast country, by advancing towards the east into unknown provinces. These were discovered by hunters in their excursions after game, or by soldiers employed in levying the taxes; and the court of Muscovy estimated the importance of those countries only by the small addition which they made to its revenue. At length, Peter the Great, ascended the Ruffian throne: His enlightened, comprehensive mind, intent upon every circumstance that could aggrandize his empire, or render his reign illustrious, discerned consequences of those discoveries, which had escaped the observation of his ignorant predecessors. He perceived, that, in proportion as the regions of Asia extended towards the east, they must approach nearer to America; that the communication between the two continents, which had long been searched for in vain, would probably be found in this quarter; and that, by opening this intercourse, some part of the wealth and commerce of the western world might be made to flow into his dominions by a new channel. Such an object suited a genius that enlightened in grand schemes. Peter drew up instructions with his own hand for prosecuting this design, and gave orders for carrying it into execution.

"His successors adopted his ideas, and pursued his plan. The officers whom the Ruffian court employed in this service, had to struggle with so many difficulties, that their progress was extremely slow. Encouraged by some faint traditions among the people of Siberia concerning a successful voyage in the year 1648 round the north-east promontory of Asia, they attempted to follow the same course. Vessels were fitted out, with this view, at different times, from the rivers Lena and Kolyma; but in a frozen ocean, which nature seems not to have defined for navigation, they were exposed to many disasters, without being able to accomplish their purpose. No vessel fitted out by the Ruffian court ever doubled this formidable cape; we are indebted for what is known of those eastern provinces of Asia, to the discoveries made in excursions by land. In all those provinces, an opinion prevails, that countries of great extent and fertility lie at no considerable distance from their own coasts. These the Ruffians imagined to be part of America; and several circumstances occurred not only in confirming them in this belief, but in persuading them that some portion of that continent could not be very remote. Trees of various kinds, unknown in those naked regions of Asia, are driven upon the coast by an easterly wind. By the same wind floating ice is brought thither in a few days; flights of birds arrive annually from the same quarter; and a tradition obtains among the inhabitants, of an intercourse formerly carried on with some countries situated to the east.

"After weighing all these particulars, and comparing the position of the countries in Asia which they had discovered, with such parts in the north-west of America as were already known; the Ruffian court formed
At present, they plough those lands, over which ships formerly on foot, and now they fail over lands which were, formerly, cultivated: earthquakes have swallowed some lands, and subterraneous fires have thrown up others: the rivers have formed new foil with their mud: the sea, retiring from the shores, has lengthened the land in some places, and advancing in others has diminished it; it has separated some territories which were formerly united, and formed new straits and gulfs. We have examples of all these revolutions in the past century. Sicily was united to the continent of Naples, as Eubea, now the Black-Sea, was to Bessia. Diodorus, Strabo, and other ancient authors, say the same thing of Spain, and of Africa, and affirm, that by a violent eruption of the ocean upon the land between the mountains Abyla and Calpe, that communication was broken, and the Mediterranean-Sea was formed. Among the people of Ceylon there is a tradition that a similar eruption of the sea separated their island from the peninsula of India. The fame thing is believed by those of Malabar with respect to the isles of Maldives, and with the Malayans with respect to Sumatra. It is certain, says the count de Buffon, that on Ceylon the earth has lost 30 or 40 leagues, which the sea has taken from it; on the contrary, Tongres, a place of the Low-Countries, has gained 30 leagues of land from the sea. The northern part of Egypt owes its existence to inundations of the Nile. The earth which this river has brought from the inland countries of Africa, and deposited in its inundations, has formed a foil of more than 25 cubits of depth. In like manner, adds the above author, the province of the Yellow-River in China, and that of Louisiana, have only been formed by the mud of rivers. Pliny, Seneca, Diodorus, and Strabo, report innumerable examples of similar revolutions, which we omit, that our difference may not become too prolix, as also many modern revolutions, which are related in the history of the earth of the Count de Buffon and other authors. In South-America, all those who have observed with philosophic eyes the peninsula of Yucatan, do not doubt that that country has once been the bed of the sea; and, on the contrary, in the channel of Bahama, many indications show the island of Cuba to have been once united to the continent of Florida. In the strait which separates America from Asia many islets are found, which probably were the mountains belonging to that tract of land which we suppose to have been swallowed up by earthquakes; which is made more probable by the multitude of volcanoes which we know of in the peninsula of Kamchatka. It is imagined, however, that the sinking of that land, and the separation of the sea from those continents, has been occasioned by those great and extraordinary earthquakes mentioned in the histories of the Americans, which formed an era almost as memorable as that of the deluge. The histories of the Toltecas fix such earthquakes in the year I Tecpatl; but as we know not to what century that belonged, we can form no conjecture of the time that great calamity happened. If a great earthquake should overwhelm the isle of Senuz, and there should be at the same time as great a scarcity of historians as there were in the first ages after
after the deluge, it would be doubted, in 300 or 400 years after, whether Asia had ever been united by that part to Africa; and many would firmly deny it.

Whether that great event, the separation of the continents, took place before or after the population discovery by the Savages, or not, we are indebted to the abovementioned navigators for a description of the inhabitants: the Scythians, and other nations, at several periods, arrived there, and inhabited that country, a needle, in various shapes, being the usual arms of the ancient Britons. As the natives of New-Zealand do at present, and as the ancient Britons did with the herb glaftum, or woad, and the Virginians, on the first discovery of that country by the English.

The Scythians were said, for a certain time, annually to transform themselves into wolves, and again to resume the human shape. The new discovered Americans about Nootka-Sound, at this time, disguise themselves in drefses made of the skins of wolves, and other wild beasts, and wear even the heads fitted to their own. These habits they use in the chase, to circumvent the animals of the field, but would not be ascribed to ignorance or superstition ascribe to a supernatural metamorphosis their temporary expedients to deceive the brute creation.

In their marches, the Kamtschatkans never went barefoot, but followed one another in the same track, and dress common to the eastern Indians & the Americans.

The Scythians, the most numerous nation resident in Siberia, prick their faces with small punctures, with a needle, in various shapes; then rub them into charcoal, so that the marks become indelible. This custom is still observed in several parts of America. The Indians on the back of Hudson's Bay, to this day, perform the operation exactly in the same manner, and puncture the skin into various figures; as the natives of New-Zealand do at present, and as the ancient Britons did with the herb glaftum, or woad, and the Virginians, on the first discovery of that country by the English.

The Tungufi use canoes made of birch-bark, distilled over ribs of wood, and nicely fowed together. The Canadian, and many other American nations, use no other fort of boats. The paddles of the Tungufi are broad at each end: those of the people near Cook's river, and of Oonalasa, are of the same form.

In burying the dead, many of the American nations place the corpse at full length, after preparing it according to their customs; others place it in a sitting posture, and lay by it the most valuable clothing, wampum, and other matters. The Tartars did the same: and both people agree in covering the whole with earth, so as to form a tumulus, barrow, or cairned.

Some of the American nations hang their dead in trees. Certain of the Tungufi observe a similar custom.

We can draw some analogy from dreses; convenience in that article must have been confulted on both continents, and originally the materials must have been the same, the skins of birds and beasts. It is singular, that the conic bonnet of the Chines who should be found among the people of Nootka. I cannot give into the notion
The brute creation migrated by the same route.

The continent which flocked America with the human race, is, suppos'd, by Mr Pennant, to have pour'd in the brute creation, through the same passage. Very few quadrupeds continued in the peninsula of Kamtschatka; Mr Pennant enumerates only 25 which are inhabitants of land: all the rest perished in their migration, and fixed their residence in the New-World. Seventeen of the Kamtschatkan quadrupeds are found in America: others are common only to Siberia, or Tartary, having, for unknown causes, entirely evacuated Kamtschatka, and divided themselves between America and the parts of Asia above cited. Multitudes, again, have deferted the Old-World, even to an individual, and fixed their seats at distances most remote from the spot from which they took their departure; from mount Ararat, the resting-place of the ark, in a central part of the Old-World, and excellently adapted for the diffusion of the animal creation, to all its parts. "We need not be startled (says Mr Pennant) at the vast journeys of the quadrupeds to arrive at their present seats. Might not numbers of species have found a convenient abode in the vast alps of Asia, instead of wandering to the Cordilleris of Chili? or might not others have been contented with the boundless plains of Tartary, instead of travelling thousands of miles to the extensive flats of Pampas? — To endeavour to elucidate common difficulties is certainly a trouble worthy of the philosopher, and of the divine; not to attempt it would be a criminal indolence, a neglect to

Vindicate the ways of God to man. But there are multitudes of points beyond the human ability to explain, and yet are truths undeniable: the facts are indubitable, notwithstanding the causers are concealed. In such cases, faith must be called in to our relief. It would, certainly, be the height of folly to deny to that Being who broke open the great fountain of the deep to effect the deluge—and afterwards, to compel the dispersion of mankind to people the globe, directed the confusion of languages—powers inferior in their nature to those. After these wondrous proofs of omnipotency, it will be absurd to deny the possibility of infusing instinct into the brute creation. Deus eft anima brutorum; "God himself is the soul of brutes:" his pleasure must have determined their will, and directed several species, and even whole genera, by impulsive irresistible, to move by flow progression to their destined place. But for that, the Ima and the paco might still have inhabited the heights of Armenia, and some more neighbouring Alps, instead of labouring to gain the distant Peruvian Andes; the whole genus of armadillos, flow of foot, would never have quitted the torrid-zone of the Old-World for that of the New; and the whole tribe of monkeys would have gamboled together in the forests of Indie, instead of dividing their residence between the shades of Indofian, and the deep forests of the Brazils. Lions and tigers might have infested the hot parts of the New-World, as the first do the desarts of Africa, and the half the provinces of Asia; or the pantherine animals of South-America might have remained additional scourges with the savage beasts of those ancient continents. The Old-World would have been overflown with animals; the New remained an unanimated waste! or both have contained an equal portion of every beast of the earth. Let it not be objected, that animals bred in a southern climate, after the descent of their parents from the ark, would be unable to bear the frost and snow of the rigorous north, before they reached South-America, the place of their final destination. It must be considered, that the migration must have been the work of ages; that in the course of their progress each generation grew hardened to the climate it had reached; and that, after their arrival in America, they would again be gradually accustomed to warmer and warmer climates, in their removal from north to south, as they had in the reverse, or from south to north. Part of the tigers still inhabit the eternal snows of Ararat, and multitudes of the very same species live, but with exalted rage, beneath the line, in the burning soil of Borneo, or Sumatra; but neither lions or
A ME

America—tigers ever migrated into the New-World. A few of
the first are found in India and Perhia, but they are
found in numbers only in Africa. The tiger extends
as far north as the north, and never has reached
America."

In fine, the conjectures of the learned respecting the
vicinity of the Old and New-World are now, by the
discoveries of late great navigators, lost in conviction;
and, in the place of imaginary hypotheses, the real
place of migration is almost incontrovertibly pointed out.
Some (from a passage in Plato) have extended over the
Atlantic, from the shores of Gibraltar to the coast of
North and South-America, an island equal in size to the
continents of Asia and Africa; over which has passed,
as over a bridge, from the latter, men and animals;
wool-headed negroes, and lions and tigers, none of
which ever existed in the New-World. A mighty sea
arose, and, in one day and night, engulfed this stupen-
dous tract, and with it every being which had not
completed its migration into America. The whole
egro race, and almost every quadraped, now inhabi-
tants of Africa, perished in this critical day. Five only
are to be found, at present, in America; and of these
only one, the bear, in South-America: Not a single
custom, common to the natives of Africa and America,
to evince a common origin. Of the quadrupeds, the
bear, fox, wolf, fox, and weefel, are the only ani-
mals which we can pronounce, with certainty, to be
found on each continent. The bear, fox, and the
weefel, have made, alfo, no farther progress in Africa
than the north; but on the fame continent the wolf is
spread over every part, yet is unknown in South-Ame-
rica, as are the fox and weefel. In Africa and in South-
America the bear is very local, being met with only
in the north of the firth, and on the Andes in the lat.
Some cause unknown arrested its progress in Africa,
and impelled the migration of a few into the Chilian-
Alps, and induced them to leave unoccupied the vull
tract from North-America to the lofty Cordilleras.

Allusions have often been made by travellers and
others, to some remains in America which appeared to
force the qualified people to abandon them, and were
familiar with the arts of life than the savage tribes which
inhabited this continent on its firft discovery by the
Europeans, or that those which are, at present, scattered
through various parts of its extent. In a small work,
published in London, in 1787, entitled Observations on
some parts of natural history; to which is prefixed, an
account of several remarkable vestiges of an ancient
date, which have been discovered in different parts of
America. Part I. the author has collected the scattered
hints of Kalm, of Carver, of Filfon, and some other
travellers, and writers; and has added a plan and
description of a regular work, which he supposes to
have been a fortification, that has been discovered near
the confluence of the rivers Ohio and Muskingum.
The remains described, or alluded to, in this publica-
tion, are characters, or singular marks, which were
fupposed by some Jesuits, who examined them, to be
Tartarian; furrows, as if the land had been ploughed;
a stone wall; mounds of earth, of different forms and
sizes; earthen walls, and ditches, &c.

The mounds of earth are fupposed, by the author, to
have been designed for different purpofes: the smaller
ones are, evidently, tumufl, or repositories of the dead;
and, he thinks, the larger ones, as that at Grave-Creek
(a branch of the Ohio); many which are to be seen in
Mexico, and in other parts of America, were intended
to serve as the bases of temples.

The most curious part of this little work is the de-
scription, together with the plan, of the supposed for-
tification, above alluded to. It is situated on the east
side of the river Muskingum, about half a mile above its
junction with the river Ohio, nearly in the latitude of
39. 21. and about 170 miles below Fort-Pitt, at the
confluence of the rivers Alleghany and Monangahela.
The town, as it has been sometimes called, is a large
level, encompassed by walls of a tetragon form;
occupying a piece of ground about one quarter of a
mile square. These walls are from six to ten feet in
height, and from twenty to forty feet in thickness.
They are, at present, overgrown with vegetables, of
different kinds, and, among others, with trees, some of
which are of a very considerable diameter. Each side
of the walls is divided, by three openings, into four, nearly equal, parts: these openings are directly
opposite to each other. Within the walls there are
tree elevations; the largest of these is of an oblong
form, 74 yards long, 44 yards broad, and 6 feet in
height: the second is nearly of a similar form, 50
yards long, and 40 broad: the third is, also, an oblong
mount, but much smaller. Besides these three eleva-
tions, there is a small circular mount, placed nearly in
the centre of the small cavels; and a semi-circular
parapet," which, it is not improbable, may have been
designed to guard one of the chafms, or openings: this
parapet has a small mount. The author observes,
that the three elevations "considerably resemble some
of the eminences which have been discovered near the
river Mississipp, of which he has given an ac-
count in his publication.

The fortifications (for a distinction has been made
between them and the town, but we cannot see with
what great propriety) are nearly of the fame form as the
town. The walls have here, also, openings: and at
each of these openings there is one, or more of the fine
circular mounts.

The pyramid is one of the most conspicuous parts of
these singular remains. It is of a circular form; 50
feet in height; 90 feet in circumference; and is sur-
ronded with a ditch, 5 feet deep, and 15 feet wide:
externally to the ditch there is a parapet, which is 759
feet in circumference. "The pyramid, as well as
the eminences and walls, is now covered with graves,
and other kinds of vegetables." Besides these, there
are several other eminences, of which we do not think
it necessary to take any notice, in this place.

The author's opinion concerning these remains is
this; that they owe their original to "the Toltecas, or
some other Mexican nation," and that these people
were, probably, the descendants of the Danes. The
first member of this conjecture appears not improbable,
if we consider the similarity of the Mexican mounts and
fortifications, described by Torquemada, by the Abbe
Clavigero, and by other authors, to those of which our
author has published an account; and, also, if we con-
der the tradition of the Mexicans, that they came from
the north-west, in which tract great numbers of these
remains have been discovered. As to the second mem-
ber of this conjecture, we think it but feebly supported;
although
The ancients supposed that the ancients had some imperfect notion of the New-World; and several ancient authors are quoted in confirmation of this opinion. In a book, ascribed to the philosopher Aristotle, we are told that the Carthaginians discovered an island, beyond the pillars of Hercules, large, fertile, and finely watered, with navigable rivers, but uninhabited. This island was distant a few days' sailing from the continent; its beauty induced the discoverers to settle there; but the policy of Carthage dissuaded the colony, and laid strict prohibition on all the subjects of the state not to attempt any future establishment. This account is also confirmed by an historian of no mean credit, who asserts, with all the extravagant marks of joy and admiration, that he returned home, and, especially if the meaning has been evidently added, he retains the Tyrians would have settled a colony and left the name of Skælinges, or dwarfish people, from their small stature. They were armed with bows and arrows, and had leathern canoes, such as they have at present. All this is probable; nor should the tale of the German, called Tukel, one of the crew, invalidate the account.

He was, one day, musing; but soon returned, leaping and singing, with all the extravagant marks of joy he bore; and, on discovering the inebriating fruit of his country, the grape: Torfæus even says, that he returned in a state of intoxication. To convince his commander, he brought several bunches; and the country, from that circumstance, was named Vineland. There appears no reason to doubt of the discovery; it is thought probable, however, that these people reached no farther than the barren country of Labrador. In short, it is from a much later period that we must date the unquestionable discovery of America.

Towards the close of the 15th century, Venice and Genoa being rivals in commerce, in which the former had greatly the superiority, Christopher Colon, or Columbus, a native of Genoa, conceived a project of failing to the East-Indies by directing his course westward. This design was founded upon a mistake of the geographers, of those days, who placed the eastern parts of Asia immensely too far to the eastward; so that they had been in the right, the shortest way would have been to sail directly westward. Columbus applied, first, to his own countrymen; but being rejected by them, he applied to Portugal, where he met with no better success. Spain was his next resource; here, after eight years' attendance, he obtained, in 1492, by the aid of ships. The largest, a ship of no considerable burthen, was commanded by Columbus, as admiral, who gave it the name of Santa Maria, out of respect for the blessed Virgin, whom he honoured with singular devotion. Of the second, called the Pinta, Martin Pinzon was captain, and his brother Francis pilot. The third, named the Niña, was under the command of Vincent Yanez Pinzon. These two were light vessels, hardly superior in burden, or force, to large boats. This squadron, if it merits that name, was victualled for 12 months, and had on board 90 men, mostly sailors, together with a few adventurers, who followed the fortune of Columbus, and some gentleman of Isabel's court, whom she appointed to accompany him. Though the expense of the undertaking was one of the circumstances which chiefly alarmed the court of Spain, and retarded, so long, the negotiation with Columbus, the sum employed in fitting out this squadron did not exceed 4000L.

As Columbus was deeply impressed with sentiments of religion, he would not set out upon an expedition so arduous, and of which one great object was to extend the knowledge of the Christian faith, without imploping, publicly, the guidance...
dance and protection of Heaven. With this view, he, together with all the persons under his command, marched, in solemn procession, to the monastery of Râbida. After confessing their sins, and obtaining absolution, they received the holy sacrament from the hands of the guardian, who joined his prayers to theirs for the success of an enterprise which he had so zealously patronized.

Next morning, being Friday, the third day of August, in the year 1492, Columbus set sail, a little before sun-rise, in presence of a vast crowd of spectators, who sent up their supplications to Heaven for the prosperous issue of the voyage, which they wished, rather than expected. Columbus steered, directly, for the Canary-Islands, and arrived there without any occurrence that would have deferred notice on any other occasion: but, in a voyage of such expectation and importance, every circumstance was the object of attention. The rudder of the Pinta broke loose, the day after the left the harbour, and that accident alarmed the crew, no less superstitiously than unfeelingly, as a certain omen of the unfortunate destiny of the expedition. Even in the short run to the Canaries, the ships were found to be so crazy, and ill appointed, as to be very improper for a navigation which was expected to be both long and dangerous. Columbus refitted them, however, to the best of his power; and having supplied himself with fresh provisoes, he took his departure from Gomera, one of the most westerly of the Canary-Islands, on the sixth day of September.

Here the voyage of discovery may properly be said to begin; for Columbus, holding his course due west, left, immediately, the usual track of navigation, and stretched into unfrequented and unknown seas. The first day, as it was very calm, he made but little way; but on the second he lost sight of the Canaries; and many of the sailors, already dejected and dismayed, when they contemplated the boldness of the undertaking, began to beat their breasts, and to shed tears, as if they were never more to behold land. Columbus comforted them with assurances of success, and the prospect of vast wealth, in those opulent regions which he was conducting them. He regulated every thing by his sole authority; he superintended the execution of every order; and, allowing himself only a few hours for sleep, he was at all other times upon deck. As his course lay through seas which had not, formerly, been visited, the founding-line, or instruments for observation were continually in his hands. After the example of the Portuguese discoverers, he attended to the motion of tides and currents, watched the flight of birds, the appearance of fishes, of sea-weeds, and of every thing that floated on the waves, and entered every occurrence, with a minute exactness, in the journal which he kept. As the length of the voyage could not fail of alarming sailors inustituated only to short excursions, Columbus endeavoured to conceal from them the real progress which they made. With this view, though they ran 18 leagues the second day, after they left Gomera, he gave out that they had advanced only 15, and he, uniformly, employed the same artifice of reckoning short, during the whole voyage. By the 14th of September, the fleet was above 200 leagues to the west of the Canary-Islands. There they were struck with an appearance, no less astonishing than new. They observed that the magnetic needle, in their compasses, did not point exactly to the polar star, but varied towards the west; and, as they proceeded, this variation increased. This appearance, which is now most observed by the mariners, though it still remains one of the mysteries of nature, into the cause of which the ingenuity of man hath not been able to penetrate, filled the companions of Columbus with terror. They were now in a boundless, unknown, ocean, far from the usual course of navigation; nature itself seemed to be altered, and the only guide which they had left was about to fail them. Columbus, with no less quickness than ingenuity, invented a reason for this appearance, which, though it did not satisfy himself, seemed so plausible to them, that it dispelled their fears, or silenced their murmurs.

He still continued to steer due west, nearly in the same latitude with the Canary-Islands. In this course, he came within the sphere of the trade-wind, which blows, invariably, from east to west, between the tropics, and a few degrees beyond them. He advanced before this steady gale with such uniform rapidity, that it was seldom necessary to shift a sail. When about 400 leagues to the west of the Canaries, he found the sea covered with weeds, that it resembled a meadow of vast extent; and in some places they were so thick, as to retard the motion of the vessels. This strange appearance occasioned new alarm and disquiet. The sailors imagined that they were now arrived at the utmost boundary of the navigable ocean; that these floating weeds would obstruct their farther progress, and conceal dangerous rocks, or some large tract of land, which had sunk, they knew not how, in that place. Columbus endeavoured to persuade them, that what had alarmed, ought rather to have encouraged them, and was to be considered a sign of approaching land. At the same time, a brisk gale arose, and carried them forward. Several birds were seen hovering about the ship, and directed their flight towards the west. The despairing crew resumed some degree of spirits, and began to entertain fresh hopes.

Upon the first of October they were, according to the admiral's reckoning, 770 leagues to the west of the Canaries: but, left his men should be intimidated by the prodigious length of the navigation, he gave out that they had proceeded only 584 leagues; and, fortunately for Columbus, neither his own pilot, nor those of the other ships, had skill sufficient to correct this error, and to discover the deceit. They had, now, been above three weeks at sea: they had proceeded far beyond what former navigators had attempted, or deemed possible; all their prognostics of discovery, drawn from the flight of birds, and other circumstances, had proved fallacious; the appearances of land, with which their own credulity, or the artifice of their commander, had, from time to time, flattered and amused them, had been altogether illusive, and their prospect of success seemed now to be as distant as ever. These reflections occurred often to men, who had no other object, or occupation, than to reason and to discourse concerning the intention and circumstances of their expedition. They made impression, at first, upon the ignorant and timid, and extending, by degrees, to such as were better informed, or more resolute, the contagion spread, at length, from ship to ship. From secret whispers and murmurs, they proceeded to open cabals and public complaints.
They taxed their sovereign with inconsiderate credulity, in paying such regard to the vain promises and rash conjectures of an indigent foreigner, as to hazard the lives of so many of her own subjects, in prosecuting a chimerical scheme. They affirmed that they had fully performed their duty, by venturing so far in an unknown and hopeless course, and could incur no blame, for refusing to follow, any longer, a desperate adventurer to certain destruction. They contended, that it was necessary to think of returning to Spain, while their crazy vessels were still in a condition to keep the sea, but expressed their fears that the attempt would prove vain, as the wind, which had hitherto been favourable to their course, melt render it impossible to fall in the opposite direction. All agreed that Columbus should be compelled by force to adopt a measure on which their common safety depended. Some of the more audacious proposed, as the most expedient and certain method for getting rid, at once, of his remonstrances, to throw him into the sea; being persuaded that, upon their return to Spain, the death of an unsuccessful projector would excite little concern, and be inquired into with no curiosity.

Columbus was fully sensible of his perilous situation. He had observed, with great uneasiness, the fatal operation of ignorance, and of fear, in producing disaffection, among his crew, and feared that it was now ready to burst out into open mutiny. He retained, however, perfect presence of mind. He affected to seem ignorant of their machinations. Notwithstanding the agitatation and solicitude of his own mind, he appeared with a cheerful countenance; like a man satisfied with the progress which he had made, and confident of success. Sometimes he employed all the arts of insinuation to soothe his men. Sometimes he endeavoured to work upon their ambition, or avarice, by magnificent descriptions of the fame and wealth which they were about to acquire. On other occasions, he assumed a tone of authority, and threatened them with vengeance from their sovereign, if, by their dastardly behaviour, they should defeat this noble effort to promote the glory of God, and to exalt the Spanish name, above that of every other nation. Even with seditions sailors, the words of a man, whom they had been accustomed to reverence, were weighty and persuasive; and not only restrained them from those violent excesses which they meditated, but prevailed with them to accompany his admiral for some time longer.

As they proceeded, the indications of approaching land seemed to be more certain, and excited hope in proportion. The birds began to appear in flocks making towards the south-west. Columbus, in imitation of the Portuguese navigators, who had been guided in several of their discoveries by the motion of birds, altered his course from due west towards that quarter, whither they pointed their flight. But after holding on for several days in this new direction without any better success than formerly, having seen no object during 30 days but the sea and the sky, the hopes of his companions subsided faster than they had risen; their fears revived with additional force: impatience, rage, and despair, appeared in every countenance. All sense of subordination was lost. The officers, who had hitherto concurred with Columbus in opinion, and supported his authority, now took part with the private men: they assembled, tumultuously, on the deck, expostulated with their commander, mingled threats with their expostulations, and required him instantly to tack about, and to return to Europe. Columbus perceived that it would be of no avail to have recourse to any of his former arts, which having been tried so often had lost their effect; and that it was impossible to rekindle any zeal for the success of the expedition among men whose breasts fear had extinguished every generous sentiment. He saw that it was no less vain to think of employing either gentle or severe measures, to quell a mutiny so general and so violent. It was necessary, on all these accounts, to foother the passions which he could no longer command, and to give way to a torrent too impetuous to be checked. He promised, solemnly, to his men, that he would comply with their request, provided they would accompany him, and obey his commands for three days longer, and if, during that time, land were not discovered, he would then abandon the enterprise and direct his course towards Spain.

Enraged as the sailors were, and impatient to turn their faces again towards their native country, this proposition did not appear to them unreasonable. Nor did Columbus hazard much in confining himself to a term so short. The prefiges of discovering land were far from the number and promising, that he deemed them infallible. For some days the sounding line had reached the bottom, and the spoil which it brought up indicated land to be at no great distance. The flocks of birds increased; and were composed not only of sea fowl, but of such land-birds as could not be supposed to fly far from the shore. The crew of the Pinta observed a cane floating which seemed to be newly cut, and likewise a piece of timber artificially carved. The sailors aboard the Niagra took up the branch of a tree, with red berries, perfectly fresh. The clouds around the setting sun assumed a new appearance; the air was more mild and warm; and, during night, the wind became unequal and variable. From all these symptoms, Columbus was so confident of being near land, that, on the evening of the 11th of October, after public prayers for success, he ordered the sails to be furlled and the ships to lie by, keeping strict watch, lest they should be driven ashore in the night. During this interval of suspense and expectation, no man shut his eyes, all kept upon deck, gazing intently towards that quarter where they expected to discover the land, which had been so long the object of their wishes.

About two hours before midnight, Columbus standing on the forecastle, observed a light at a distance. Their joy and privately pointed it out to Pedro Gutierrez, a page and calling to Salcedo, commander of the fleet, all three saw it in motion, as if it were carried from place to place. A little after midnight, the joyful sound of Land! land! was heard from the Pinta, which kept always a-head of the other ships. But having been so often deceived by fallacious appearances, every man was now become low of belief; and waited, in all the anguish of uncertainty and impatience, for the return of day. As soon as morning dawned, all doubts and fears were dispelled. From each ship, an island was seen about two leagues to the north, while flat and verdant fields, well flored with wood, and watered with many rivulets, presented the aspect of a delightful country.
The crew of the Pinta instantly began the Te Deum, as a hymn of thanksgiving to God; and were joined by those of the other ships, with tears of joy and transports of congratulation. This office of gratitude to Heaven was followed by an act of justice to their commander. They threw themselves at the feet of Columbus, with feelings of self-condemnation mingled with reverence. They imploréd him to pardon their ignorance, incredulity, and insolence, which had created him so much unnecessary disquiet, and had so often obstructed the prosecution of his well-concerted plan; and palling, in the warmth of their admiration, from one extreme to another, they now pronounced the man whom they had so lately reviled, and threatened, to be a person inspired by Heaven, with sagacity and fortitude more than human, in order to accomplish a design so far beyond the ideas and conception of all former ages.

As soon as the sun arose, all their boats were manned and armed. They rowed towards the island with their colours displayed, with warlike music, and other martial pomp. As they approached the shore, they saw it covered with a multitude of people, whose novelty of the scene had drawn together, whose attitudes and gestures expressed wonder and astonishment, at the strange objects which presented themselves to their view. Columbus was the first European who set foot in the New-World, which he had discovered. He landed in a rich dress, and with a naked sword in his hand. His men followed; and, kneeling down, they all knelt down the ground which they had so long desired to see. They, next, erected a crucifix; and, prostrating themselves before it, returned thanks to God for conducing their voyage to such an happy issue.

The above was one of the Bahama-Islands; to which he gave the name of San Salvador; and took possession of it, in the name of their Catholic majesties. In this first voyage he discovered several other of the Lucayo, or Bahama-Islands, with those of Cuba and Hispaniola. The natives considered the Spaniards as divinities, and the discharge of the artillery their thunder: they fell prostrate at the sound. The women, however, offered their favours, and courted the embraces of their new guest as men. Their husbands were not jealous of them; and in the arms of those wantons the companions of Columbus are said, by some authors, to have caught that malady which directs its poison to the springs of life. In a second voyage, many new islands were discovered. In a third, he attained the great object of his ambition, by discovering the continent of America, near the mouth of the river Oronoko, on the first day of August 1498. His succés produced a crowd of adventurers, from all nations; but the year before this, the northern continent had been discovered by Sebasbían Cabot, in the service of Henry VII. of England.

Notwithstanding the many settlements of the Europeans in this continent, great part of America remains still unknown. The northern continent contains the British colonies of Hudson's-Bay, Canada, and Nova Scotia; the New-England states, New-York, New-Jersey, Pennsylvania, Maryland, Virginia, North and South, Carolina, and Georgia. It contains, also, the Spanish territories of East, and West, Florida, Louisiana, New-Mexico, California, and Mexico. Besides these, there are immense regions to the west, and north, the boundaries of which have never yet been discovered. In America, such assurance in any degree known, dwell the Algonqui, the Hurons, the Iroquois, the Cheerkas, the Chickaaws, and many other tribes of Indians. In the southern continent lie the Spanish provinces of Tiera-Firme, Guiana, Peru, Paraguay, and Chili; together with that of Brazil, belonging to the Portuguese; and the country of Surinam, belonging to the Dutch.

Vast tracts, however, in the inland parts, are unknown, being comprehended under the general name of America. A large district, also, laid to be the residence of a gigantic race of men, lies on the east side of the continent, between the straits of Magellan and the province of Paraguay. See the article Patagonia.

This vast country produces many of the metals, minerals, plants, fruits, trees, and wood, to be met with in the other parts of the world, and many of them in greater quantities, and in high perfection. The gold and silver of America have supplied Europe with such immense quantities of those valuable metals, that they are become vastly more common; so that the gold and silver of Europe now bear little proportion to the high price set upon them before the discovery of America.

It also produces diamonds, pearls, emeralds, amethysts, and other valuable stones, which, by being brought into Europe, have contributed, likewise, to lower their value. To these, which are the chief productions of Spanish America, may be added a great number of other commodities, which, though of less price, are of much greater use. Of these are the plentiful supplies of cochineal, indigo, anatto, logwood, balsa, jute, pimento, lignum vitæ, rice, ginger, cocoa, or the chocolate-nut, sugar, cotton, tobacco, bananas, red-wood, the balsams of Tolo, Peru, and Chili, that valuable article, in medicine, the jefuit's bark, mechoacan, saffrañas, farfparilla, cañas, tamarinds, hides, furs, ambergris, and a great variety of woods, roots, and plants; to which, before the discovery of America, the Europeans were entirely strangers, or which they were forced to buy at an extravagant rate from Asia and Africa, through the hands of the Venetians and Genoese, who then engrossed the trade of the Eastern-World.

On this continent there grows also a variety of excellent native fruits; as pine-apples, citrons, lemons, oranges, malictons, figs, grapes, great numbers of culinary, medicinal, and other herbs, roots, and plants, with many exotic productions, which are nourished in as great perfection as in their native soil.

Although the Indians still live in the quiet possession of many large tracts, America, so far as known, is chiefly claimed, and divided into colonies, by three European nations, the Spaniards, English, and Portuguese. The Spaniards, as they first discovered it, have the largest and richest portion, extending from New-Mexico and Louisiana, in North-America, to the straits of Magellan, in the South-Sea, excepting the large province of Brazil, which belongs to Portugal; for though the French and Dutch have some forts upon Surinam and Guiana, they fearfully deferve to be considered as proprietors of any part of the southern continent.

Next to Spain, the most considerable proprietor of America was Great Britain, who derived her claim to North-America from the first discovery of that continent by Sebasbían Cabot, in the name of Henry VII.
America. anno 1497, about six years after the the discovery of South-America by Columbus, in the name of the king of Spain. This country was in general called Newfoundland; a name which is now appropriated solely to an island upon its coast. It was a long time before the English made any attempt to settle in this country. Sir Walter Raleigh, an uncommon genius and a brave commander, first showed the way, by planting a colony in the southern part, which he called Virginia, in honour of his virgin mistress Queen Elizabeth.

The French indeed, from this period until the conclusion of the war before last, laid a claim to, and notions were adequately high in their own favour. They deemed themselves, not without reason, entitled to every kindreds and indulgence which the mother-country could bestow.

Although their pretensions did not amount to a perfect equality of advantages and privileges in matters of commerce, yet in those of government they thought themselves sufficiently competent to the task of conducting their domestic concerns, with little or no interference from abroad. Through willing to admit the supremacy of Great Britain, they viewed it with a vigilant eye, and with a marked desire to restrain it within its strict constitutional boundaries.

Their improvements in all the necessary and useful arts did honor to their industry and ingenuity. Though they did not live in the luxury of Europe, they had all the solid and substantial enjoyments of life, and were not unequipped with many of its elegancies and refinements.

A circumstance much to their praise is, that notwithstanding their peculiar addiction to those occupations of which luxury is the sole object, they were duly attentive to cultivate the field of learning; and they have, ever since their first foundation, been particularly careful to provide for the education of the rising progeny.

Their vast augmentation of internal trade and external commerce, was not merely owing to their position and facility of communication with other parts; it arose also from their natural turn and temper, full of schemes and projects; ever aiming at new discoveries, and continually employed in the search of the means of improving their condition.

Their condition carried them into every quarter from whence profit could be derived. There was scarcely any part of the American hemisphere to which they had not extended their navigation. They were continually exploring new fields of trade, and were found in every spot where business could be transacted.

To this extensive and incessant application to commerce, they added an equal vigilance in the administration of their affairs at home. Whatever could conduct to the amelioration of the soil they prosecuted, to the progress of agriculture, or to the improvement of their domestic circumstances, was attended to with so much labour and care, that it may be strictly said that Nature had given them nothing of which they did not make the most.

In the midst of this solicitude and toil in matters of business, the affairs of government were conducted with readiness, prudence, and lenity, seldom experienced, and never exceeded, in the best regulated countries of Europe.

Such was the situation of the British colonies in general throughout North America, and of the New-England provinces in particular, when the pacification above-
above-mentioned opened one of the most remarkable scenes that ever commanded the attention of the world.

In treating of the American revolution, it has become a fashion with the English writers to ascribe that event to the successful intrigues of the French government. Instead of contemplating it, with the characteristic philosophy of their country, as the result of a conflict between the desire of power, and the abhorrence of oppression, they have sought the origin of the evil in any source rather than their own miscon duct; and have endeavoured at once, to hush the rep roaches of their political conscience, and to gratify the cravings of their national animosity, in wild conj ections of a scheme formed by their neighbours to divide the British Empire, and in declamatory invective against the Gallic faith and honour. Thus it has been repeatedly asserted, that the French having long view ed, with equal envy and apprehension, the flourishing state of the colonies which Britain had founded in America, began immediately after the peace of Paris to carry into execution their project for separating them from the mother country. Several such emil­eraries, it is said were employed in spreading disat taction among the colonists; and the effects produced by these macabre spirits are described to have been a rapid diminution of that peculiar warmth of attach ment, which the inhabitants of North-America had hitherto demonstrated for the mother country; the ex citement of a jealousy which led them to view her rather in the light of a sovereign than of a parent; and the introduction of a hostile policy which taught them to examine, with a scrupulous nicety, the nature of the theses which rendered them parts of her empire. That such emilaries, it is said, were in fact supported by any document which the purity of historical truth can admit; and although the effects here de scribed, have certainly appeared, it must be remembered that their appearance followed, but did not precede, the attempts of Britain upon the rights and liberties of America. By mere artifice and address to have alienated the affections of the colonists from their mother country, at the close of a war in which their interests and feelings had been intertwined with more than usual strength and energy, was a task of infinite difficulty; not purely to be accomplished in the short period be tween the declaration of peace in 1763, and the pro mulgation of the first obnoxious acts of the British par liament in 1765. Before, if we refer these effects to an other cause, to a love of liberty, and a quick sense of injury, their appearance will be natural and just; con­fident with the American character, and correspon ding with the conduct which was displayed in all the vicissitudes that attended the revolt.

In March, 1764, a bill was passed, by which heavy duties were laid on goods imported into the colonies, from such West-India Islands as did not belong to Great Britain; at the same time that these duties were to be paid into the exchequer in specie; and in the same session, another bill was framed to restrain the currency of paper-money in the colonies themselves. Not only the principle of taxation, but the mode of collection was considered as an unconstitutional and oppressive innovation; for the penalties incurred by an infraction of the acts of parliament, might be recovered in the courts of admiralty, before a single judge (whose salary was the fruit of the forfeitures he decreed) without trial by jury, or any of the other benefits of common law juris prudence. These acts coming so close to each other threw the whole continent into the utmost ferment. Though remonstrances were made to the ministry, and every argument made use of that reason or ingenuity could suggest, but no effect resulted. Their reasoning, however, convinced a great number of people in Britain; and thus the American cause came to be con sidered as the cause of liberty.

The Americans, finding all argumentation vain, at last united in an agreement to import no more of the manufactures of Great Britain, but to encourage to the utmost of their power every thing of that kind among themselves. Thus the British manufacturers also became a party against the ministry, and did not fail to express their resentment in the strongest terms; but the ministry were not so easily daunted, and therefore proceeded to the last step of their intended plan, which was to lay on stamp duties throughout the continent. Previous to this, indeed, several regulations were passed in favour of the commerce of the colonies; but they had now imbibed such unfavourable sentiments of the British ministry, that they paid very little regard to any thing pretended to be done in their favour; or if these acts made any favourable impression, it was quickly obliterated by the news of the stamp act. The reasons given for this act, so exceedingly obnoxious, was, that a sum might be raised sufficient for the defence of the colonies against a foreign enemy; but this pretence was so far from giving any satisfaction to the Americans, that it excited their indignation to the utmost degree. They not only affirmed that they were abundantly able to defend themselves against any foreign enemy, but denied that the British parliament had any right to tax them at all.

It would be superfluous to enter into any arguments used by the contending parties on this important occasion. It was evident that the matter was not to be decided by argument, but by force of arms; and the British ministry, too confident of the authority and power of that country, determined to carry on matters with an high hand, to terrify the colonists into an implicit submission, or, if that would not do, to compel them to it by force. The stamp act, after a violent opposition in parliament, was passed, and its reception in America was such as had been expected. The news, and the act itself, first arrived at Boston, where the bells were muffled and rung a funeral peal. The act was first hawked about the streets with a Death's head, affixed to it, and flayed the folly of England, and the Ruin of America;" and afterwards publicly burnt by the enraged populace: The flamps themselves were feized and destroyed, unless brought by men of war, or kept in fortified places; those who were to receive the stamp duties were compelled to resign their offices; and such of the Americans as fled with government on this occasion, had their houses plundered and destroyed.

Though these outrages were committed by the multitude, they were first connived at by those of superior rank, and the principles on which they were founded afterwards openly patronized by them; and the doctrine
It was now found absolutely necessary either to yield to the Americans, by repealing the obnoxious statutes, or to enforce them by arms. The ferment had diffused itself universally throughout the colonies. Virginia first, and after that all the rest of the provinces, declared against the right of Britain to lay taxes in America; and that every attempt tovelt others with this power besides the king, or the governor of the province and his general assembly, was illegal, unconstitutional, and unjust. Non-importation agreements were every where entered into; and it was even resolved to prevent the sale of any more British goods after the present year. American manufactures, though dearer, as well as inferior in quality to the British, were universally preferred. An association was entered into against eating of lamb, in order to promote the growth of wool; and the ladies with cheerfulness agreed to renounce the use of every species of ornament manufactured in Britain. Such a general and alarming con­ fer­ ency determined the ministry to repeal some of the most obnoxious statutes; and to this they were the more inclined by a petition from the first American congress, held at New York in the beginning of October 1765.

The stamp-act was therefore repealed, to the universal joy of the Americans, and indeed to the general satisfaction of the English, whole manufactures had begun to suffer very severely in consequence of the American association against them. The disputes on the subject without doors, however, were by no means silenced, but each party continued to argue the cause as violently asever. The celebrated Dr Benjamin Franklin was, on this occasion examined before the House of Commons; and his opinion was in substance as follows:

"That the tax in question was impracticable and ruinous. The very attempt had so far alienated the affection of the colonies, that they behaved in a less friendly manner towards the natives of England than before; considering the whole nation as conspiring against their liberty, and the parliament as willing rather to oppress than to support and aflift them. America, in fact, did not stand in any need of British ma­ nufactures, having already begun to construct such as might be deemed absolutely necessary, and that with such success, as left no doubt of their arriving in a short time at perfection. The elegancies of dress had already been renounced for manufactures of the American kind, though much inferior; and the bulk of the people, consisting of farmers, were such as could in no way be affected by the want of British commodities, as having every necessity within themselves. Materials of all kinds were to be had in plenty: the wool was fine; flax grew in great abundance; and iron was every where to be met with."

The Doctor also infisted, That "the Americans had been greatly misrepresented; that they had been traduced as void of gratitude and affection for the parent state; than which nothing could be more contrary to truth. In the war of 1755 they had, at their own expense, raised an army of 2500 men; and in that of 1759, they assisted the British expeditions against South America with several thousand men, and had made many brave exertions against the French in North America. It was said that the war of 1755 had been undertaken in defence of the colonies; but the truth was, that it originated from a contest about the limits between Canada and Nova-Scotia, and in defence of the English rights to trade on the Ohio. The Americans, however, would still continue to act with the colonies in a friendly manner towards the natives of England than to oppress them; though compo­ sed of those who had been active against the stamp-act, less favourable to the measures than in all probability they would otherwise have been. An unlucky circumstance at the same time occurred, which threw every thing once more into confusion. One of the new ministry, Mr Charles Townshend, having declared that he could find a way of taxing the friendship of the Americans without giving them offence, was called upon to propose his plan. This was by imposing a duty upon tea, paper, painters colours, and glass imported into America. The conduct of the New York assembly, repealing the troops, and that of Boston, which had proceeded in a similar manner, caused this bill to meet with less opposition than otherwise it might have done. As a punishment to the refractory assemblies, the legislative power was taken from that of New York, until it should fully comply with the terms of the act. That of Boston at last submitted with reluctance. The bill for the new taxes was quickly passed, and sent to America in 1768.

A ferment much greater than that occasioned by the stamp-act now took place throughout the continent. The populace renewed their outrages, and those of inferior fiction entered into regular associations against it.
The convention, however, had not been allowed to deliver their intending to excite a rebellion which the governor now hurried up to the king's ships out of the harbour.

While the disposition of the Bostonians was thus more more and more irritate news arrived that the agent behaved as for the colony had not been allowed to deliver their increase; petition to the king; it having been objected, that the assembly without the governor was not sufficient authority. This did not contribute to allay the ferment; and it was further augmented by the news that a number of troops had been ordered to repair to Boston, to keep the inhabitants in awe.

A dreadful alarm now took place. The people called on the governor to convene a general assembly, in order to remove their fears of the military; who, they said, were to be assembled overthrow their liberties, and force obedience to laws to which they were entirely averse. The governor replied, it was no longer in his power to call an assembly; having, in his last instructions from England, been required to wait the king's orders, the matter being then under consideration at home. Being thus refused, the people took upon themselves the formation of an assembly, which they called a convention. The proceedings and resolutions of this body could naturally partake of the temper and disposition of the late assembly; but they were more violent, and having voted "that there is apprehension in the minds of many of an approaching rupture with France," requested the inhabitants to put themselves in a posture of defence against any sudden attack of an enemy; and circular letters were directed to all the towns in the province, acquainting them with the resolutions that had been taken in the capital, and exhorting them to proceed in the same manner. The town of Hatfield alone refused its concurrence. The convention, however, thought proper to afford the governor of their pacific intentions, and reafured their request that an assembly might be called; but being refused any audience, and threatened with being treated as rebels, they at last thought proper to disolve of themselves, and having been over to Britain a circumstantial account of their proceedings, with the reason of their having assembled in the manner already mentioned.

The expected troops arrived on the very day on which the convention broke up, and had some houses in the town fitted up for their reception. Their arrival had a considerable influence on the people, and for some time seemed to put a stop to the disturbances; but the spirit of the people was now so much routed, that it was
was impossible to quench the flame. The late outrageous behaviour in Boston had given the greatest offence in England; and, notwithstanding all the efforts of opposition, an address from both houses of parliament was presented to the king, in which the colonists of Massachusetts-Bay were fet forth in the most amiable manner, and the most vigorous measures recommended for reducing them to obedience. The Americans, however, continued steadfast in the ideas they had adopted. Though the troops had for some time quieted the disturbances, yet the calm continued no longer than they appeared respectable on account of their number; but as soon as this was diminished by the departure of a large detachment, the remainder were treated with contempt, and it was even resolved to expel them altogether. The country people took up arms for this purpose, and were to have alligned their friends in Boston; but before this design could be put in execution, an event happened which put an end to every idea of reconciliation between the contending parties.

On the 5th of March 1770, a fracas happened between the soldiers and a party of the town's people. The inhabitants poured in from all quarters to the af- fistance of opposition, an address of protest being presented to the king, requesting the viour of the colony of Massachusetts-Bay was killed; the officers and soldiers were immediately arrested, and were to have been tried for murder. The事件 Rhew & Co., and the tea-merchant, were brought before the superior court at Boston, but they were acquitted, two men being found guilty of manslaughter. The officers and soldiers were immediately arrested, and were to have been tried for murder. The event shewed that their conduct was declared groundsless and scandalous. Matters were now ripe for the utmost extremities on the part of the Americans; and they were brought on in the following manner. Though the colonies had entered into a non-importation agreement against tea as well as all other commodities from Britain, it had nevertheless found its way into America, though in smaller quantities than before. This was largely felt by the East-India Company, who had now agreed to pay a large sum annually to the government for which compliance, and to make up their losses in other respects, they were empowered to export their tea free from any duty payable in Britain; and in consequence of this premilion, several ships freighted with the commodity were sent to North-America, and proper agents appointed for disposing of it. The Americans now perceiving that the tax was thus likely to be enforced whether they would or not, determined to take every possible method to prevent the tea from being landed, as well knowing that it would be impossible to hinder the sale, should the commodity once be brought on shore. For this purpose the people assembled in great numbers, forcing those to whom the tea was confined to resign their offices, and to promise solemnly never to refuse them; and committees were appointed to examine the accounts of merchants, and make public tests, declaring such as would not take them enemies to their country. Nor was this behaviour confined to the colony of Massachusetts-Bay; the rest of the provinces entered into the contest with the same warmth, and manifested the same resolution to oppose this invasion of their rights. 

In the midst of this confusion, three ships laden with tea arrived in Boston; but so much were the captains alarmed at the disposition which seemed to prevail among the people, that they offered, providing they could obtain the proper discharges from the tea-con- signees, custom-house, and governor, to return to Britain without landing their cargoes. The parties concerned, however, though they durst not order the tea to be landed, refused to grant the discharges required. The ships, therefore, would have been obliged to main in the harbour; but the people apprehensive
that if they remained there, the tea would be landed in small quantities and disposed of in spite of every endeavours to prevent it, resolved to destroy it at once.

This resolution was executed with equal speed and effect. The very evening after the above mentioned discharges had been refused, a number of people dressed like Mohawk Indians boarded the ships and threw into the sea their whole cargo, consisting of 342 chests of tea; after which they retired without making any further disturbance, or doing any other damage. No tea was destroyed in other places, though the same spirit was everywhere manifested. At Philadelphia the pilots were enjoined not to conduct the vessels up the river; and at New-York, though the governor caused some tea to be landed under the protection of a man of war, he was obliged to deliver it up to the custody of the people to prevent its being sold.

The destruction of the tea at Boston, which happened in November 1773, was the immediate prologue to the disasters attending civil discord. Government finding themselves everywhere insulted and defied, resolved to enforce their authority by all possible means; and as Boston had been the principal scene of the riots and outrages, it was determined to punish that city in an exemplary manner. Parliament was acquainted by a message from his majesty with the undutiful behaviour of the city of Boston, as well as of all the colonies, recommending to the latter the most vigorous and spirited exertions to reduce them to obedience. The parliament in its address promised a ready compliance; and indeed, the Americans seemed now to have lost many of their partisans. It was proposed to lay a fine on the town of Boston equal to the price of the tea which had been destroyed, and to shut up its port by armed vessels until the refractory spirit of the inhabitants should be subdued; which, it was thought, must quickly yield, as a total stop would thus be put to their trade. The bill was strongly opposed on the ground that the other had been; and it was predicted, that, instead of having any tendency to reconcile or subdue the Americans, it would infallibly exasperate them beyond any possibility of a reconciliation. The petitions against it, presented by the colony's agent, pointed out the same consequences in the strongest terms, and in the most positive manner declared that the Americans never would submit to it; but such was the infatuation attending every rank and degree of men, that it never was imagined the Americans would dare to revile the parent state openly, but would in the end yield implicitly to her commands. In this confidence, a third bill was proposed for the impertinent administration of justice on such persons as might be employed in the suppression of riots and tumults in the province of Massachusetts-Bay. By this act it was provided, that should any persons acting in that capacity be indicted for murder, and not able to obtain a fair trial in the province, they might be sent by the governor to England, or to some other colony, if necessary, to be tried for the supposed crime. These three bills having passed so easily, the ministry proposed a fourth, relative to the government of Canada; which, it was said, had not yet been settled on any proper plan. By this bill the extent of that province was greatly enlarged; its affairs were put under the direction of a council in which Roman Catho-

lics were to be admitted; the Roman Catholic clergy were secured in their possessions and the usual perquisites from those of their own profession. The council abovementioned were to be appointed by the crown; to be removable at its pleasure; and to be invested with every legislative power, excepting that of taxation.

No sooner were these laws made known in America, than they cemented the union of the colonies almost beyond any possibility of dissolving it. The assembly of Massachusetts-Bay had passed a vote against the judges accepting salaries from the crown, and put the question, Whether they would accept them as usual from the general assembly? Four answered in the affirmative; but Peter Oliver, the chief-justice, refused. A petition against him, and an accusation, were brought before the governor; but the latter refused the accusation, and declined to interfere in the matter; but as they still intimated for justice against Mr Oliver, the governor thought proper to put an end to the matter by dissolving the assembly.

In this situation of affairs, a new alarm was occasioned by the news of the port-bill. This had been totally unexpected, and was received with the most extravagant expressions of displeasure among the populace, and while these continued, the new governor, General Gage, arrived from England. He had been chosen to this office on account of his being well acquainted in America, and generally agreed to by the people; but human wisdom could not now point out a method by which the flame could be allayed. The first act of his office as governor was to remove the assembly to Salem, a town 17 miles distant, in consequence of the late act. When this was intimated to the assembly, they replied by requesting him to appoint a day for public humiliation for depriving the wrath of heaven, but met with a refusal. When met at Salem, they passed a resolution, declaring the necessity of a general congress composed of delegates from all the provinces, in order to take the affairs of the colonies at large into consideration; and five gentlemen remarkable for their opposition to the British measures, were chosen to represent that of Massachusetts-Bay. They then proceeded with all expedition to draw up a declaration, containing a detail of the grievances they laboured under; and the necessity of exerting themselves against unlawful power; they set forth the disregard shown to their petitions, and the attempts of Great Britain to destroy their ancient constitution; and concluded with exhorting the inhabitants of the colony, to obstruct, by every method in their power, such evil designs, beginning at the same time a total renunciation of every thing imported from Great-Britain, till a redress of grievances could be procured.

Intelligence of this declaration was carried to the governor on the very day that it was completed; on which he dissolved the assembly. This was followed by an address from the inhabitants of Salem in favour of the crown; to which the latter replied, some imagine that the course of trade might be turned hither, and to our benefit; but nature, in the formation of our harbour, forbids our becoming rivals in commerce with that convenient mart; and were it otherwise,
otherwise, we must be dead to every idea of justice, lost to all feelings of humanity, could we indulge one thought to seize on wealth, and raise our fortunes on the ruin of our suffering neighbours.

It had been fondly hoped by the ministerial party at home that the advantages which other towns of the colony might derive from the annihilation of the trade of Boston, would make them readily acquiesce in the measure of shutting up that port, and rather rejoice in it than otherwise; but the words of the address above mentioned seemed to preclude all hope of this kind; and subsequent transactions only manifested it to be totally vain. No sooner did intelligence arrive of the remaining bills passed in the session of 1774, than the cause of Boston became the cause of all the colonies. The port-bill had already occasioned violent commotions throughout them all. It had been repealed in provincial meetings, and resistance even the last had been recommended against such oppression.

In Virginia, the first of June, the day on which the port of Boston was to be shut up, was held as a day of humiliation, and a public intercession in favour of America was enjoined. The style of the prayer enjoined at this time was, that "God would give the people one heart and one mind, firmly to oppose every invasion of the American rights." The Virginians, however, did not content themselves with acts of religion. They recommended in the strongest manner a general congress of all the colonies, as fully persuading that an attempt to tax any colony in an arbitrary manner was in reality an attack upon them all, and must ultimately end in the ruin of them all.

The provinces of New-York and Pennsylvania, however, were less sanguine than the rest, being to closely connected in the way of trade with Great Britain, that the giving it up entirely appeared a matter of the most serious magnitude, and not to be thought of but after every other method had failed. The intelligence of the remaining bills respecting Boston, however, spread a fresh alarm throughout the continent, and fixed those who had seemed to be the most wavering. The proposal of giving up all commercial intercourse with Britain was again proposed; contributions for the inhabitants of Boston were raised in every quarter; and they every day received addresses commending them for the heroism with which they sustained their calamity.

The Bostonians on their part were not wanting in their endeavours to promote the general cause. An agreement was framed, which in imitation of former times, they called a Solemn League and Covenant. By this the subscribers most religiously bound themselves to break off all communication with Britain after the expiration of the month of August ensuing, until the obnoxious acts were repealed; at the same time they engaged neither to purchase nor use any goods imported after that time, and to renounce all connection with those who did, or refused to subscribe to this covenant; threatening to publish the names of the refractory; which at this time was a punishment by no means to be despised. Agreements of a similar kind were almost instantaneously entered into throughout all America. General Gage indeed attempted to counteract the covenant by a proclamation, wherein it was declared an illegal and traiterous combination, threatening with the pains of law such as subscribed or countenanced it. But matters were too far gone for his proclamations to have any effect.

The Americans retorted the charge of illegality on his own proclamation, and insulted that the law allowed subjects to meet in order to consider of their grievances, and associate for relief from oppression.

Preparations were now made for holding the general congress so often proposed. Philadelphia, as being the most central and considerable town, was pitched upon for the place of its meeting. The delegates, of whom it was to be composed, were chosen by the representatives of each province, and were in number from two to seven for each colony, though no province had more than one vote. The first congress, which met at Philadelphia, in the beginning of September 1774, consisted of 51 delegates. The novelty and importance of the meeting excited and universal attention; and their transactions were such as could not but tend to render them respectable.

The first act of congress was an approbation of the conduct of Massachusets-Bay, and an exhortation to continue in the same spirit with which they had begun. Supplies for the suffering inhabitants (whom the operation of the port-bill had reduced to great distress) were strongly recommended; and it was declared, that in case of attempts to enforce the obnoxious acts by arms, all America should join to afflict the town of Boston; and, should the inhabitants be obliged, during the course of hostilities, to remove further up the country, the losses they might sustain should be repaired at the public expense.

They next addressed General Gage by letter; in which, having stated the grievances of the people of Massachusets colony, they informed him of the fixed and unalterable determination of all the other provinces to support their brethren and to oppose the British acts of parliament; that they themselves were appointed to watch over the liberties of America; and intreated him to desist from military operations, lest such hostilities might be brought on as would frustrate all hopes of reconciliation with the parent state.

The next step was to publish a declaration of their rights. Thence they summed up the rights belonging to Englishmen; and particularly insisted, that as their distance rendered it impossible for them to be represented in the British parliament, their provincial assemblies, with the governor appointed by the king, constituted the only legislative power within each province. They would, however, consent to such acts of parliament as were evidently calculated merely for the regulation of commerce, and securing to the parent state the benefits of the American trade; but would never allow that they could impose any tax on the colonies, for the purpose of raising a revenue, without their consent. They proceeded to reprobate the intention of each of the new acts of parliament; and insisted on all the rights they had enumerated as being unalienable, and what none could deprive them of. The Canada act they particularly pointed out as being extremely inimical to the colonies, by whose allience it had been conquered; and they termed it "An Act for establishing the Roman Catholic religion in Canada, abolishing the equitable system of English laws, and establishing a tyranny there."
declared in favour of a non-importation and non-consumption of British goods, until the acts were repealed by which duties were imposed upon tea, coffee, wine, sugar, and molasses, imported into America, as well as the Boston port-act, and the three others passed in the preceding session of parliament. The new regulations against the importation and consumption of British commodities were then drawn up with great solemnity; and they concluded with returning the warmest thanks to those members of parliament who had, with so much zeal, though without any succour, opposed the obnoxious acts of parliament.

Their next proceedings were, to frame a petition to the king, an address to the British nation, and another to the colonies; all of which were so much in the usual spirited strain of American language for some time past, that it is needless to enter into any particular account of them. It is sufficient to say, that they were all drawn up in a matterly manner, and ought to have impressed the people of England with a more favourable idea of the Americans than they could at that time be induced to entertain.

All this time the disposition of the people had corresponded with the warmest wishes of congress. The first of June had been kept as a fast, not only throughout Virginia, where it was first proposed, but through the whole continent. Contributions for the diftresses of Boston had been raised throughout America, and people of all ranks seemed to be particularly touched with them. Even those who seemed to be most likely to derive advantage from them, took no opportunity, as has been already intimated in the case of Salem. The inhabitants of Marblehead also showed a noble example of magnanimity in the present case. Though situated in the neighbourhood of Boston, and most likely to derive benefit from their diftresses, they did not attempt to take any advantage, but generously offered the use of their harbour to the Bostonians, as well as their wharfs and warehouses, free of all expense. In the mean time the British forces at Boston were continually increasing in number, which greatly augmented the general jealousy and dissatisfaction; the country were ready to take at a moment's warning; and the experiment was made by giving a false alarm that the communication between the town and country was to be cut off, in order to reduce the former by famine to a compliance with the acts of parliament. On this intelligence, the country people assembled in great numbers, and could not be satisfied until they had sent messengers into the city to enquire into the truth of the report. These messengers were enjoined to inform the town's people, that if they should be so pusillanimous as to make a surrender of their liberties, the province would not think itself bound by such examples; and that Britain, by breaking their original charter, had annulled the contract subsisting between them, and left them to act as they thought proper.

The people in every other respect manifested their inflexible determination to adhere to the plan they had so long followed. The new councillors and judges were obliged to resign their offices, in order to preserve their lives and properties from the fury of the multitude. In some places they shut up the avenues to the courts houses; and, when required to make way for the judges, replied, that they knew of none but such as
This disposition, known to be almost universal throughout the continent, was in the highest degree satisfactory to congress. Every one saw that the ensuing spring was to be the season of commencing hostilities, and the most indefatigable diligence was used by the colonies to be well provided against such a formidable enemy. A lift of all the sensible men in each colony was made out, and especially of those who had served in the former war; of whom they had the satisfaction to find that two-thirds were still alive and fit to bear arms. Magazines of arms were collected, and money was provided for the payment of troops. The governors in vain attempted to put a stop to these proceedings by proclamations; the fatal period was now arrived: and the more the servants of government attempted to repress the spirit of the Americans, the more determined it appeared.

The difficulties of the inhabitants of Boston were reduced to great difficulties. The British troops, now distinguished by the name of the enemy, were absolutely in possession of it: the inhabitants were kept as prisoners, and might be made accountable for the conduct of the whole colonies; and various measures were contrived to relieve the latter from such a disagreeable situation. Sometimes it was thought expedient to remove the inhabitants altogether; but this was impracticable without the governor's content. It was then proposed to set fire to the town at once, after valuing the houses and indemnifying the proprietors; but this being found equally impracticable, it was resolved to wait some other opportunity, as the garrison were not very numerous, and not being supplied with necessaries by the inhabitants, might soon be obliged to leave the place. The friends of British government indeed attempted to do something in opposition to the general voice of the people; but after a few ineffectual meetings and resolutions, they were utterly silenced, and obliged to yield to the superior number of the patriots.

Matters had now proceeded so far that the prospect of reconciliation or friendship with Britain became daily more evident, that arms must ultimately decide the contest, experts in military discipline was recommended in the strongest manner, and several military institutions enacted; among which that of the minute-men was one of the most remarkable. There were chosen from the most active and expert among the militia; and their business was to keep themselves in constant readiness at the call of their officers; from which perpetual vigilance they derived their title. It was now easily seen that a flight occasion would bring on hostilities, which could not but be attended with the most violent and certain destruction to the vanquished party; for both were so much exasperated by a long course of reproaches and literary warfare, that they seemed to be filled with the utmost invertebrity against each other.

On the 26th of February General Gage having been informed that a number of field-pieces had been brought to Salem, dispatched a party to seize them. Their road was obstructed by a river, over which was a draw-bridge. This the people had pulled up, and refused to let it down: upon which the soldiers seized a boat to ferry them over; but the people cut out her bottom. hostilities would immediately have commenced, had it not been for the interpolation of a clergyman, who represented to the military, on the one hand, the folly of opposing such numbers; and to the people, on the other, that as the day was far spent the military could not execute their design, so that they might without any fear leave them the quiet possession of the draw-bridge. This was complied with; and the soldiers, after having remained for some time at the bridge, returned without executing their orders.

The next attempt, however, was attended with more serious consequences. General Gage having been informed that a large quantity of ammunition and military stores had been collected at Concord, about 20 miles from Boston, and where the provincial congresses was sitting, sent a detachment, under the command of Colonel Smith and Major Pitcairn, to destroy the stores, and, as was reported, to seize Messrs. Hancock and Adams, the leading men of the congresses. They set out before day-break, on the 19th of April, marching with the utmost silence, and securing every one they met on the road, that they might not be discovered. But notwithstanding all their care, the continual ringing of bells and firing of guns as they went along, soon gave them notice that the country was alarmed.

About
About five in the morning they had reached Lexington 15 miles from Boston, where the militia of the place were exercising. Major Pitcairn called out to them, "dispers, ye rebels; throw down your arms and disperse;" but, as they still continued in a body, he advanced, drove them off, and ordered his soldiers, who instantly obeyed, and killed and wounded several of the militia: a dispersion of the militia was the consequence. The detachment then proceeded to Concord, where, having destroyed the stores, they fired upon the Americans; and a feuille en face, in which several fell on both sides. The purpose of their expedition being thus accomplished, it was necessary for the king's troops to retreat, which they did through a continual fire kept up on them from Concord to Lexington. Here their ammunition was totally expended; and they would have been unavoidably cut off, had not a considerable reinforcement commanded by Lord Percy met them. The Americans, however, continued their attack with great spirit; and the British would still have been in the utmost danger had it not been for two field-pieces which Lord Percy had brought with him. By these the impetuosity of the Americans was checked, and the British made good their retreat to Boston, with the loss of 273 killed wounded and made prisoners: that of the Americans was about 50 killed, 38 wounded and missing.

From the commencement of hostilities, the dispute between Great Britain and the colonies took a new direction. By this engagement the spirits of the Americans were raised; a considerable army was assembled, who formed a line of entrenchment from Roxbury to Mystic, through a space of about 30 miles; and here they were soon after joined by a large body of Connecticut troops, under General Putnam, an old officer of great bravery and experience. By this formidable force was the town of Boston now kept blocked up. General Gage, however, had so strongly fortified it, that the army powerful as they were, durst not make an attack; while on the other hand, his force was too insignificant to meet such an army in the field. But towards the end of May, a considerable reinforcement having arrived, with Generals Howe, Burgoyne, and Clinton, he was soon enabled to attempt something of consequence. Some skirmishes in the mean time happened in the islands lying off Boston harbour, in which the Americans had the advantage, and burnt an armed schooner, which her people had been obliged to abandon after she was left aground by the tide. Nothing decisive, however, took place, till the 17th of June.

In the neighbourhood of Charlestown, a place on the northern shore of the peninsula on which Boston stands, is an high ground called Bunker's Hill, which overlooks and commands the whole town of Boston. In the night of the 6th the provincials took possession of this place: and worked with such indefatigable diligence, that, to the astonishment of their enemies, they had before day-light, almost completed a redoubt, with a strong entrenchment reaching half a mile eastward, as far as the river Mystic. After this they were obliged to detain a heavy and incessant fire from the ships and floating batteries with which Charlestown neck was surrounded, as well as the cannon that could reach the place from Boston; in spite of which, however, they continued their work, and finished it before mid-day. A considerable body of foot was then landed at the foot of Bunker's Hill, under the command of Generals Howe and Pigot; the former being appointed to attack the lines, and the latter the redoubt. The Americans, however, having the advantages of ground, as well as of their intrenchments, continued down such incessant fire, that it threatened the whole body with destruction; and General Howe was for a little time left almost alone, all his officers being killed or wounded. The provincials in the mean time had taken possession of Charlestown, so that General Pigot was obliged to contend with them in that place as well as in the redoubt. The consequence was, that he was overmatched; his troops were thrown into disorder; and he would have been defeated, had not General Clinton advanced to his relief: upon which the attack was renewed with such fury, that the provincials were driven beyond the neck that leads to Charlestown. In the heat of the engagement the British troops, in order to deprive the Americans of a cover, set fire to Charlestown, which was totally consumed; and, eventually, the Americans were obliged to retreat over Charlestown neck, and was raked by an incessant fire from the Glasgow man of war, and several floating batteries. The losses on the British side amounted to about 1000, among whom were 19 officers killed and 70 wounded; that of the Americans did not exceed 139 killed, and 314 wounded.

The British troops claimed the victory of this engagement; but it must be allowed that it was dearly bought; and the Americans boasted that the real advantages were on their side, as they had so much weakened the enemy that they durst not afterwards venture out of their entrenchments. Although this was the first time the provincials had been in actual service, they behaved themselves with the spirit of veterans, and by no means merited the appellation of cowards, with which they were so often branded in Britain. In other places the fame determined spirit of resistance appeared on the part of the Americans. Lord North's conciliatory scheme was utterly rejected by the assemblies of Pennsylvania and New-Jersey, and afterwards in every other colony. The commencement of hostilities at Lexington determined the colony of New-York, which had hitherto continued to waver, to unite with the rest; and as the situation of New-York renders it unable to resist an attack from the sea, it was resolved, before the arrival of a British fleet, to secure the military stores, put off the women and children, and set fire to the city if it was still found incapable of defence. The exportation of provisions was everywhere prohibited, particularly to the British seafery on the Banks of Newfoundland, or to such colonies of America as should adhere to the British interest. Congress resolved on the establishment of an army, and of a large paper currency in order to support it. In the inland northern colonies, Colonel Easton and Ethan Allen, without receiving any orders from Congress, or communicating their designs to any party in the colony, formed the army of Crown-Point, Ticonderago, and the rest that form a communication between the colonies and Canada. On this occasion 200 pieces of cannon fell into their hands, besides mortars, and a large quantity of military stores, together with two armed vessels, and materials for the construction of others.

After
After the battle of Bunker's Hill, the provincials erected fortifications on the heights which commanded Charlestown, and strengthened the def in such a manner that there was no hope of driving them from thence; at the same time that their activity and boldness astonished the British officers, who had been accustomed to entertain a mean and unjust opinion of their courage.

The troops, thus shut up in Boston, were soon reduced to distress. Their necessities obliged them to attempt the carrying off the American cattle on the islands before Boston, which produced frequent skirmishes; but the provincials, better acquainted with the navigation of those shores, landed on the islands, destroyed or carried off whatever was of any use, burned the light-house at the entrance of the harbour, and took prisonors the workmen sent to repair it, as well as a party of marines who guarded them. Thus the garrison were reduced to the necessity of lending out armed vessels to make prizes indiscriminately of all that came in their way, and of landing in different places to plunder for subsistence as well as they could.

The congress in the mean time continued to act with all the vigour which its constituents had expected. Articles of confederacy and perpetual union were drawn up and solemnly agreed upon; by which they bound themselves and their posterity for ever. These were in substance as follows. 

1. Each colony was to be independent within itself, and to retain an absolute sovereignty in all domestic affairs.

2. Delegates to be annually elected to meet in congress, at such time and place as should be enacted in the preceding congresses.

3. This assembly should have the power of determining war or peace, making alliances; and in short all that power which sovereigns of states usually claim as their own.

4. The expenses of war to be paid out of the common treasury, and raised by a poll-tax on miles between 16 and 60; the proportions to be determined by the laws of the colony.

5. An executive council to be appointed to act in place of the congress during its recess.

6. No colony to make war with the Indians without consent of congress.

7. The boundaries of all the Indian lands to be secured and ascertained to them; and no purchasers of lands were to be made by individuals, or even by a colony, without consent of congress.

8. Agents appointed by congress should reside among the Indians, to prevent frauds in trading with them, and to relieve, at the public expense, their wants and difficulties.

9. This confederation to last until there should be a reconciliation with Britain; or, if that event should not take place, it was to be perpetual.

After the action of Bunker's Hill, however, when the power of Great Britain appeared less formidable in the eyes of America than before, congress proceeded formally to justify their proceedings in a declaration drawn up in terms more expressive, and well calculated to excite attention.

"Were it possible (said they) for men who exercised their reason, to believe that the divine Author of our existence intended a part of the human race to hold an absolute property in and unbounded power over others, marked out by his infinite goodness and wisdom as the objects of a legal domination, never rightfully retaliated, however severe and oppressive: the inhabitants of these colonies might at least require from the parliament of Great Britain some evidence that this dreadful authority over them had been granted to that body: but a reverence for our Great Creator, principles of humanity, and the dictates of common sense, must convince all those who reflect upon the subject, that government was instituted to promote the welfare of mankind, and ought to be administered for the attainment of that end.

"The legislature of Great-Britain, however, stimulated by an inordinate passion for power, not only unjustifiable, but which they know to be peculiarly reproved by the very constitution of that kingdom; and despairing of success in any mode of contest where regard should be had to law, truth, or right; have, at length, deferting thence, attempted to effect their cruel and impolitic purpose of enslaving these colonies by violence, and have thereby rendered it necessary for us to close with their last appeal from reason to arms. Yet, however blinded that assembly may be, by their inimical rage for unlimited domination, to flight justice in the opinion of mankind, we esteem ourselves bound by obligations to the rest of the world to make known the justice of our cause."

After taking notice of the manner in which their ancestors left Britain, the happiness attending the mutual friendly commerce between that country and her colonies, and the remarkable success of the late war, they proceed as follows: "The new ministry, finding the brave foes of Britain, though frequently defeated, yet still contending, took up the unfortunate idea of granting them a haftv peace, and of then subduing her faithful friends.

"These devoted colonies were judged to be in such a state as to prevent victories without bloodshed, and all the easy emoluments of stable plunder. The uninterrupted terror of their peaceable and respectful behaviour from the beginning of their colonization; their dutiful, zealous, and useful services during the war, though so frequently and amply acknowledged in the most honourable manner by his majesty's late king, and by parliament, could not save them from the intended innovations. Parliament was influenced to adopt the pernicious project; and assuming a new power over them, has in the course of eleven years given such decisive specimens of the spirit and consequences attending this power, as to leave no doubt of the effects of acquiescence under it.

"They have undertaken to give and grant our money without our consent, though we have ever exercised an exclusive right to dispose of our own property. Statutes have been passed for extending the jurisdiction of the courts of admiralty and vice-admiralty beyond their ancient limits; for depriving us of the acquiescent and incontestable rights of trial by jury, in cases affecting both life and property; for suspending the legislature of one of our colonies; for interdicting all commerce to the capital of another; and for altering fundamentally the form of government established by charter, and secured by acts of its own legislature; and
and solemnly confirmed by the crown; for exempting the murderers of colonists from legal trial, and in effect from punishment; for erecting in a neighbouring province, acquired by the joint arms of Great-Britain and America, a despotism dangerous to our very existence; and for quartering soldiers upon the colonists in time of a profound peace. It has also been resolved in parliament, that colonists, charged with committing certain offences, shall be transported to England to be tried.

"But why should we enumerate our injuries in detail?—By one statute it was declared, that parliament can of right make laws to bind us in all cases whatever. What is to defend us against so enormous, so unlimited a power? Not a single person who assumes it is chosen by us, or is subject to our control or influence; but, on the contrary, they are all of them exempt from the operation of such laws; and an American revenue, if not diverted from the ostensible purposes for which it is raised, would actually lighten their own burdens in proportion as it increases ours.

"We saw the misery to which such despotism would reduce us. We for ten years incessantly and ineffectually besieged the throne as suppliants; we reazoned, we remonstrated with parliament in the most mild and decent language; but administration, felonible that we should regard these measures as freemen ought to do, sent over fleets and armies to enforce them.

"We have pursued every temperate, every respectful measure; we have even proceeded to break off all commercial intercourse with our fellow-subjects, as our last peaceable admonition, that our attachment to no nation on earth would supplant our attachment to liberty: this we startled ourselves was the ultimate step of the controversy; but subsequent events have shown how vain was this hope of finding moderation in our enemies!

"The Lords and Commons, in their address in the month of February, said, that a rebellion at that time actually existed in the province of Massachusetts-Bay; and that those concerned in it had been countenanced and encouraged by unlawful combinations and engagements entered into by his majesty’s subjects in several of the colonies; and therefore they besought his majesty that he would take the most effectual measures to enforce due obedience to the laws and authority of the supreme legislature. Soon after the commercial intercourse of whole colonies with foreign countries was cut off by an act of parliament; by another, several of them were entirely prohibited from the fisheries in the seas near their coasts, on which they always depended for their subsistence; and large reinforcements of ships and troops were immediately sent over to General Gage.

"Fruitless were all the intrigues, arguments, and eloquence of an illustrious band of the most distinguished peers and commoners, who nobly and firenently ascertained the justice of our cause, to play, or even to mitigate, the headless fury with which these accumulated outrages were hurried on. Equally fruitless was the interference of the city of London, of Bristol, and of many other respectable towns in our favour." After having reproached parliament, General Gage, and the British government in general, they proceeded thus: "We are reduced to the alternative of choosing an unconditional submission to tyranny, or resistance by force. The latter is our choice. We have counted the cost of this contest, and find nothing so dreadful as voluntary slavery? Honour, justice, and humanity, forbid us tamely to surrender that freedom which we received from our gallant ancestors, and which our innocent posterity have a right to receive from us. Our cause is just; our union is perfect, our internal resources are great; and, if necessary, foreign assistance is undoubtedly attainable. We fight not for glory or conquest; we exhibit to mankind the remarkable spectacle of a people attacked by unprovoked enemies. They boast of their privileges and civilization, and yet proffer no milder conditions than servitude or death. In our native land, in defence of the freedom that is our birthright, for the protection of our property acquired by the honest industry of our forefathers and our own, against violence actually offered, we have taken up arms; we shall lay them down when hostilities shall cease on the part of our aggressors, and all danger of their being renewed shall be removed— and not before."

These are some of the most striking passages in the declaration of congress on taking up arms against Great-Britain, and dated July 6th, 1775. The determined spirit which it shows, ought to have convinced the people of Britain, that the conquest of America was an event scarce ever to be expected. In every other respect an equal spirit was shown; and the rulers of the British nation had the mortification to see those to whom they flewed edelei and trivules, succeed in negotiations in which they themselves were utterly foiled. In the passing of the Quebec bill, ministry had flattered themselves that the Canadians would be so much attached to them on account of restoring the French laws, that they would very readily join in any attempt against the colonists who had reproached that bill in such strong terms: but in this, as in every thing else indeed, they found themselves mistaken. The Canadians having been subject to Britain for a period of 15 years, and being thus rendered sensible of the advantage of British government, received the bill itself with evident disapprobation; nay, reproved it as tyrannical and oppressive. A scheme had been formed for General Carleton, governor of the province, to raise an army of Canadians wherewith to act against the Americans; and so sanguine were the hopes of administration in this respect, that they had sent 20,000 stand of arms, and a great quantity of military stores, to Quebec for the purpose. But the people, though they did not join the Americans, yet were found immovable in their purpose to stand neutral. Application was made to the bishop; but he declined to interpose his influence, as contrary to the rules of the Popish clergy: so that the utmost efforts of government in this province were found to answer little or no purpose.

The British administration next tried to engage the ministry in their cause. But though agents were dis­ pered among them with large presents to the chief, they universally replied, that they did not understand the nature of the quarrel, nor could they distinguish whether those who dwelt in America or on the other side of the ocean were in fault: but they were for­ prised
Albany, where we may hear each other speak, and not to think of shedding the blood of our brethren.

To the representatives of congress they paid more respect. They felt that, as the English on the other side of the ocean, had taken up arms to enslave, not only their countrymen in America, but the Indians also; and if the latter should enable them to overcome the colonists, they themselves would soon be reduced to a state of servitude also. By arguments of this kind these savages were engaged to remain neutral; and thus the colonists were freed from a most dangerous enemy. On this occasion the congress thought proper to hold a solemn conference with the different tribes of Indians. The speech made by them on the occasion is curious, but too long to be fully inserted. The following is a specimen of the European mode of addressing these people.

"Brothers, Sachems, and Warriors!

"We the delegates from the Twelve United Provinces, now sitting in general congress at Philadelphia, send their talk to our brothers.

"Brothers and Friends, now attend!

"When our fathers crossed the great water, and came over to this land, the king of England gave them a strong chain, and enjoy peace; and it was covenanted, that the fields, houses, goods, and possessions, which our fathers should acquire, should remain to them as their own, and be their children for ever, and at their sole disposal.

"Brothers and Friends, open an ear!

"We will now tell you of the quarrel betwixt the counsellors of King George and the inhabitants and colonies of America.

"Many of his counsellors have persuaded him to break the covenant-chain, and not to fend us any more good talks. They have prevailed upon him to enter into a covenant against us, and have torn asunder, and cast behind their backs, the good old covenant which their apecceors and ours entered into, and took strong hold of. They now tell us they will put their hands into our pockets without asking, as though it were their own, and at their pleasure they will take from us our charters, or written civil constitution, which we love as our lives; also our plantations, our houses, and our goods, whenever they please, without asking our leave. They tell us that our vessels may go to that or this island in the sea, but to this or that particular island we shall not trade any more; and in case of our non-compliance with these new orders, they shut up our harbours.

"Brothers, we live on the same ground with you; the same island is our common birth-place. We desire to sit down under the same tree of peace with you; let us water its roots, and cherish the growth, till the large leaves and flourishing branches shall extend to the setting sun, and reach the skies. If any thing disagreeable should ever fall out between us, the Twelve United Colonies, and you, the Six Nations, to wound our peace, let us immediately seek measures for healing the breach. From the present situation of our affairs, we judge it expedient to kindle up a small fire at Albany, where we may hear each other’s voice, and discompose our minds fully to one another."

The other remarkable transactions of this congress were the ultimate refusals of the conciliatory proposals made by Lord North, of which such fantastic expectations had been formed by the English ministry; and appointing a general-in-chief to command their armies, which were now very numerous. The person chosen for this purpose was George Washington; a man so universally beloved, that he was raised to such a high station by the unanimous voice of congress; and his subsequent conduct showed him every way worthy of it. Horatio Gates and Charles Lee, two English officers of considerable reputation, were chosen; the former an adjutant-general, the second a major-general. Artemus Ward, Philip Schuyler, and Israel Putnam, were likewise nominated major-generals. Seth Pomeroy, Richard Montgomery, David Wooster, William Heath, Joseph Spencer, John Thomas, John Sullivan, and Nathanael Green, were chosen brigadier generals at the same time.

Congress had now also the satisfaction to receive deputies from the colony of Georgia, extending a desire to join the confederacy. The reasons they gave for renouncing their allegiance to Britain was, that the conduct of parliament towards the other colonies had been oppressive; that though the obnoxious acts had not been extended to them, they could view this only as an omission, because of the seeming little conformance of their colony; and therefore looked upon it rather to be a slight than a favour. At the same time they framed a petition to the king, similar to that sent by the other colonies, and which met with a similar reception.

The succours which had hitherto attended the Americans in all their measures, now emboldened them to think not only of defending themselves, but likewise of acting offensively against Great-Britain. The conquest of Canada appeared an object within their reach, and one that would be attended with many advantages; and as an invasion of that province was already facilitated by the taking of Crown-Point and Ticonderoga, it was resolved if possible to penetrate that way into Canada, and reduce Quebec during the winter, before the fleets and armies which they were well assured would fail thither from Britain should arrive. By order of congress, therefore, 3000 men were put under the command of Generals Montgomery and Schuyler, with orders to proceed to Lake Champlain, from whence they were to be conveyed in flat-bottomed boats to the mouth of the river Sorel, a branch of the great river St. Lawrence, and on which is situated a fort of the same name with the river. On the other hand, they were opposed by General Carleton, governor of Canada, a man of great activity and experience in war; who, with a very few troops, had hitherto been able to keep in awe the disaffected people of Canada, notwithstanding all the representations of the colonists. He had now augmented his army by a considerable number of Indians, and promised, even in his present situation, to make a very formidable resistance.

As soon as General Montgomery arrived at Crown-Point, he received information that several armed vessels were stationed at St. John’s, a strong fort on the river Sorel,
Sorel, with a view to prevent his crossing the lake; on which he took possession of an island which commands the mouth of the Sorel, and by which he could prevent them from entering the lake. In conjunction with General Schuyler, he next proceeded to St John's; but finding that place too strong, it was agreed in a council of war, to retire to Isle aux Noix, where General Schuyler being taken ill, Montgomery was left to command alone. His first step was to gain over the Indians whom Gen. Carleton had employed, and this he in a great measure accomplished; after which, on receiving the full number of troops appointed for his expedition, he determined to lay siege to St John's. In this he was facilitated by the reduction of Chamblee, a small fort in the neighbourhood, where he found a large supply of powder. An attempt was made by General Carleton to relieve the place; for which purpose he with great pains collected about 1000 Canadians, while Colonel Maclean proposed to raise a regiment of the Highlanders who had emigrated from their own country to America.

But while Gen. Carleton was on his march with these new levies, he was attacked by the provincials, and utterly defeated; which being made known to another body of Canadians who had joined Colonel Maclean, they abandoned him without striking a blow, and he was obliged to retreat to Quebec.

The defeat of General Carleton was a sufficient recompence to the Americans for that of Colonel Ethan Allen, which had happened some time before. The success which had attended this gentleman against Crown-Point and Titondego had emboldened him to make a similar attack on Montreal; but being attacked by the militia of the place, supported by a detachment of regulars, he was entirely defeated and taken prisoner.

As the defeat of General Carleton and the defection of Maclean's forces left no room for the garrison of St John's to hope for any relief, they now contented to surrender themselves prisoners of war; but were in another respect treated with great humanity. They were in number 500 regulars and 200 Canadians, among whom were many of the French nobility, who had been very active in promoting the cause of Britain among their countrymen.

General Montgomery next took measures to prevent the British shipping from falling down the river from Montreal to Quebec. He accomplished this effectually, that the whole were taken. The town itself was obliged to surrender at discretion; and it was with the utmost difficulty that General Carleton escaped in an open boat by the favour of a dark night.

No further obstacle now remained in the way of the Americans to the capital, except what arose from the nature of the country; and these indeed were very considerable. Nothing, however, could damp the ardour of the provincials. Norwithstanding it was now the middle of November, and the depth of winter was at hand, Colonel Arnold formed a design of penetrating through woods, morasses, and the most frightful solitudes from New-England to Canada by a nearer way than that which Montgomery had chosen; and this he accomplished in spite of every difficulty, to the admonishment of all who saw or heard of the attempt. A third part of his men under another colonel had been obliged to leave him by the way, for want of provisions; the total want of artillery rendered his prospects insignificant before a place strongly fortified; and the smallness of his army rendered it even doubtful whether he could have taken the town by surprise. The Canadians indeed were amazed at the exploit, and their inclination to revolt from Britain was somewhat augmented; but none of them as yet took up arms in behalf of America. The confederation into which the town of Quebec was thrown proved detrimental rather than otherwise to the expedition; as it doubled the vigilance and activity of the inhabitants to prevent any surprise; and the appearance of common danger united all parties, who, before the arrival of Arnold, were contending most violently with one another. He was therefore obliged to content himself with blocking up the avenues to the town, in order to distress the garrison for want of provisions; and even this he was unable to do effectually, by reason of the small number of his men.

The matter was not much mended by the arrival of General Montgomery. The force he had with him, even when united to that of Arnold, was too insignificant to attempt the reduction of a place so strongly fortified, especially with the assistance only of a few mortars and field-pieces. After the siege had continued through the month of December, General Montgomery, conscious that he could accomplish his end no other way than by surprise, resolved to make an attempt on the left day of the year 1775. The method he took at this time was perhaps the best that human wisdom could devise. He advanced by break of day, in the midst of an heavy fall of snow, which covered his men from the sight of the enemy. Two real attacks were made by himself and Colonel Arnold, at the same time that two feigned attacks were made on two other places, thus to distract the garrison, and make them divide their forces. One of the real attacks was made by the people of New-York, and the other by those of New-England under Arnold. Their hopes of surprising the place, however, were defeated by the signal for the attack being through some mistake given too soon. General Montgomery himself had the most dangerous place, being obliged to pass between the river and some high rocks on which the Upper Town stands; so that he was forced to make what haste he could to close with the enemy. His fate, however, was now decided. Having forced the first barrier, a general violent discharge of musketry and grape-shot from the Montgomery killed, and the Americans defeated.

In this action, it must be confessed that the valor of the provincial troops could not be exceeded. They had
In this state of confusion the governor thought it necessary to fortify his palace with artillery, and procure a party of marines to guard it. Lord North’s conciliatory proposal arriving also about the same time, he used his utmost endeavours to cause the people comply with it. The arguments he used were plausible, and had not matters already gone to such a pitch of dissatification, it is highly probable that some attention would have been paid to them. “The view [he said] in which the colonies ought to behold this conciliatory proposal, was no more than an earnest admonition from Great-Britain to relieve their wants: that the utmost confedence had been used in the mode of application; no determinate sum having been fixed, as it was thought most worthy of British generosity to take what they thought could be conveniently spared, and likewise to leave the mode of raising it to themselves,” &c.

But the clamour and dissatisfaction were now universal, that nothing else could be attended to. The governor had called an assembly for the purpose of laying this conciliatory proposal before them; but it had been little attended to. The assembly began their febion by inquiries into the state of the magazine. It had been broken into by some of the townsmen; for which reason spring-guns had been placed there by the governor, which discharged themselves upon the offenders at their entrance: these circumstances with others of a similar kind, raised such a violent uproar, that, as soon as the preliminary balances of the febion was over, the governor retired on board a man of war, informing the assembly that he durst no longer trust himself on shore, nor retire on board a man of war.

This produced a long course of disputations, which ended in a positive refusal of the government to trust himself again in Williamsburg, even to give his assent to the bills, which could not be paffed without it, and though the assembly offered to bind themselves for his personal safety. In his turn he requested them to meet him on board the man of war, where he then was; but his proposal was rejected, and all further correspondence containing the least appearance of friendship was discontinued.

Lord Dunmore, having thus abandoned his government attempts, attempted to reduce by force those whom he could no longer govern. Some of the most fierce and adherents to the British cause, whom their zeal had rendered obnoxious at home, now turned to them. He was also joined by numbers of black slaves. With these, and the affiatice of the British shipping, he was for some time enabled to carry on a kind of predatory war sufficient to hurt and exasperate, but not to subdue. After some inconsiderable attempts on land, proclaiming liberty to the slaves, and setting up the royal standard, he took up his residence at Norfolk, a maritime town of some consequence, where the people were better affected to Britain than in most other places. A considerable force, however, was collected against him; and the natural impetuosity of his temper prompt- ing him to act against them with more courage than caution, he was entirely defeated, and obliged to retire to his shipping, which was now crowded by the number of those who had incurred the resentment of the provincials.

In the mean time a scheme of the utmost magnitude and importance was formed by one Mr Conolly, a Pennsylvanian, attached to the cause of Britain. The first object he aimed at was to raise Virginia,
He discovered and taken prisoner.

The town of Norfolk destroyed.

The governors of South and North Carolina expelled.

Miserable situation of Boston.

Boston severely cannonaded by the provincials.

211

212

213

214

215

216

217

218

The step of this plan was to enter into a league with the Ohio Indians. This he communicated to Lord Dunmore, and it received his approbation: Upon which Conolly set out, and actually succeeded in his design. On the 6th of October he was dispatched to General Dunmore, from whom he received a colonel's commission, and set out in order to accomplish the remainder of his scheme. The plan in general was, that he should return to the Ohio, where, by the affliction of the British and Indians in those parts, he was to penetrate through the back settlements into Virginia, and join Lord Dunmore at Alexandria. But by an accident very naturally to be expected, he was discovered, taken prisoner, and confined.

After the retreat of Lord Dunmore from Norfolk, that place was taken possession of by the provincials, who greatly diffused those on board Lord Dunmore's fleet, by refusing to supply them with any necessaries. This proceeding drew a remonstrance from his Lordship; in which he insisted that the fleet should be furnished with necessaries; but his request being denied, a resolution was taken to set fire to the town. After giving the inhabitants proper warning, a party landed, under cover of a man of war, and set fire to that part which lay nearest the shore; but the flames were observed at the same time to break forth in every other quarter, and the whole town was reduced to ashes. This universal destruction, occasioned a loss of more than L. 300,000.

In the southern colonies of Carolina, the governors were expelled, and obliged to take refuge on board of men of war, as Lord Dunmore had been; Mr Martin, governor of North Carolina, on a charge of attempting to raise the back-fellers, confining chiefly of Scots Highlanders, against the colony. Having secured themselves against any attempts from these enemies, however, they proceeded to regulate their internal concerns in the same manner as the rest of the colonies; and by the end of the year 1775, Britain beheld the whole of America united against her in the most determined opposition. Her vast possessions of that tract of land (since known by the name of the Thirteen United States) were now reduced to the single town of Boston; in which her forces were besieged by an army with whom they were apparently not able to cope, and by whom they must of course expire in a very short time to be expelled. The situation of the inhabitants of Boston, indeed, was peculiarly unhappy.

After having failed in their attempts to leave the town, General Gage had contented to allow them to retire with their effects; but afterwards, treacherously refused to fulfi his promise. When he resigned his place to General Howe in October 1775, the latter, apprehensive that they might give intelligence of the situation of the British troops, strictly prohibited any person from leaving the place under pain of military execution. Thus matters continued till the month of March 1776, when the town was evacuated.

On the 2d of that month, General Washington opened a battery on the west side of the town, from whence it was bombarded, with a heavy fire of cannon at the same time; and three days after, it was attacked by another battery from the eastern shore. This terrible attack continued for 14 days without intermission; when General Howe, finding the place no longer tenable, determined if possible to drive the enemy from their works. Preparations were therefore made for a most vigorous attack, on a hill called Dorchester Neck, which the Americans had fortified in such a manner as would in all probability have rendered the enterprise next to impossible. No difficulties, however, were sufficient to daunt the spirit of the general: and every thing was in readiness, when a sudden storm pre-vented an execution which must have been productive of a dreadful waste of blood. Next day, upon a more close inspection of the works they were to attack, it was thought advisable to desist from the enterprise altogether. The fortifications were very strong, and extremely well provided with artillery; and, besides other implements of destruction, upwards of 1000 hog’s heads of fowls were provided to roll down upon the enemy as they came up; which, as the ascent was extremely steep, must have done prodigious execution.

Nothing therefore now remained but to think of a place of retreat; and even this was attended with the utmost difficulty and danger. The Americans, however, knowing that it was in the power of the British general to reduce the town to ashes, which could not have been repaired in many years, did not think proper to give the least molestation; and for the space of a fortnight the troops were employed in the evacuation of the place, from whence they carried along with them 2000 of the inhabitants, who durst not stay on account of their attachment to the British cause. From Boston they failed to Halifax; but all their vigilance could not prevent a number of valuable ships from falling into the hands of the Americans. A considerable quantity of cannon and ammunition had also been left at Bunker’s Hill and Boston Neck; and in the town, an immense variety of goods, principally woolen and linen of which the provincials need very much in need. The effects of those who fled to Halifax were confiscated; as also those who were attached to government, and had remained in the town. As an attack was expected as soon as the British forces should arrive, every method was employed to render the fortifications already very strong, impregnable. For this purpose some foreign engineers were employed, who had before arrived at Boston; and every, eager were people of all ranks to accomplish this business, that every able-bodied man in the place, without distinction of rank, set apart two days in the week, to complete it the sooner.

The Americans exasperated to the utmost by the Congress proceedings of parliament, which placed them out of the royal protection, and engaged foreign mercenaries in the plan for subduing them, now formally renounced all connection with Britain, and declared themselves independent. This celebrated declaration was published on the 4th of July 1776. Previous to this circular letter had been sent through each colony, flattering the reasons for it; and such was the animosity now pervading everywhere prevailing against Great Britain, that it met with universal approbation, except in the province of Maryland alone. It was not long, however, before the people of that colony, finding themselves left in a very dangerous minority, thought proper to accede to the measures of the rest. The manifesto itself was in the usual nervous style, flattering a long list of grievances, for which redress had been often applied
America. in vain; and for these reasons they determined on a final separation; to hold the people of Britain as the rest of mankind, "enemies in war, in peace friends."

After thus publicly throwing off all allegiance and hope of reconciliation, the colonists soon found that an exertion of all their strength was required in order to support their pretensions. Their arms, indeed, had not, during this season, being attended with successes in Canada. Reinforcements had been promised to Colonel Arnold, who still continued the blockade of Quebec; but they did not arrive in time to second his operations. Being sensible, however, that he must either desert from the enterprise, or finish it successfully, he recommenced in form; attempting to burn the shipping, and even to form the town itself. They were unsuccessful, however, by reason of the smallness of their number, though they succeeded so far as to burn a number of houses in the suburbs; and the garrison were obliged to pull down the remainder, in order to prevent the fire from spreading.

As the provincials, though unable to reduce the town, kept the garrison in continual alarms, and in a very disadvantageous situation, some of the nobility collected themselves into a body under the command of one Mr. Brouene, in order to relieve their capital; but they were met on their march by the provincials, and so entirely defeated, that they were never afterwards able to attempt anything. Their want of artillery at last convinced them, that it was impracticable in their situation to reduce a place so strongly fortified; the small-pox, at the same time made its appearance in their camp, and carried off great numbers; intimidating the reft to such a degree, that they deferted in crowds. To add to their misfortunes, the British reinforcements unexpectedly appeared, and the ships made their way through the ice with such celerity, that the one part of their army was separated from the other; and General Carleton falling out as soon as the reinforcement was landed, obliged them to fly with the utmost precipitation, leaving behind them all their cannon and military stores; at the same time that their shipping was entirely captured by vessels sent up the river for that purpose. On this occasion the provincials fled with such precipitation that they could not be overtaken; so that none fell into the hands of the British, excepting the sick and wounded. General Carleton now gave a signal instance of his humanity: Being well apprized that many of the provincials had not been able to accompany the reft in their retreat, and that they were concealed in woods, &c. in a very deplorable situation, he generously issued a proclamation, ordering proper persons to seek them out, and give them relief at the public expense; at the same time lost, through fear of being made prisoners, they should refuse these offers of humanity, he promised that, as soon as their situation enabled them, they should be at liberty to depart to their respective homes.

The British general, now freed from any danger of an attack, was soon enabled to act offensively against the provincials, by the arrival of the forces destined for that purpose from Britain. By these he was put at the head of 12,000 regular troops, among whom were those of Brunswick. With this force he instantly set out to the Three Rivers, where he expected that Ar-

nold would have made a stand; but he had retired to Sorel, a place 80 miles distant from Quebec, where he was at last met by the reinforcement ordered by congress. Here, though the preceding events were by no means calculated to inspire much military ardour, a very daring enterprise was undertaken; and this was, to surprife the British troops posted here under Generals Fraer and Neibit; of whom the former commanded those on land, the latter, such as were on board of transports and were but a little way distant. The enterprize was undoubtedly very hazardous, both on account of the strength of the parties against whom they were to act, and as the main body of the British forces were advanced within 50 miles of the place; besides that a number of armed vessels and transports with troops lay between them and the Three Rivers. Two thousand chozen men, however, under General Thomasfon, engaged in this enterprise. Their success was by no means answerable to their spirit and valour. Though they palled the shipping without being observed, General Fraer had notice of their landing; and thus being prepared to receive them, they were soon thrown into disorder, at the same time that General Neibit, having landed his forces, prepared to attack them in the rear. On this occasion some field-pieces were brought in, for a digestious execution, and a retreat was found to be unavoidable, General Neibit, however, had got between them and their boats, so that they were obliged to take a circuit through a deep swamp, while they were hotly pursued by both parties at the same time, who marched for some miles on each side the swamp, till at last the unfortunate provincials were sheltered from farther danger by a wood at the end of the swamp. Their general, however, was taken with 200 of his men.

By this disaster the provincials lost all hopes of accomplishing anything more in Canada. They demolished their works, and carried off their artillery with the utmost expedition. They were pursued, however, by General Burgoyne; who on the 16th of June arrived at Fort St John's, which he found abandoned and burnt. Chambly had shared the fame fate, as well as all the vessels that were not capable of being dragged up against the current of the river; and the provincial troops had retreated across the lake to Crown-Point, whether they could not be immediately followed. Thus was the province of Canada entirely evacuated by the Americans, who had thus secured the frontiers of the adjacent states from invasion on the part of the British; the object of a campaign in which 13000 men were employed, and near a million of money expended, was rendered in a great measure abortive. General Sullivan, who conducted this retreat after the affair of General Thompson, had great merit in what he did, and received the thanks of congress accordingly.

This was followed by some transactions in the southern colonies, which farther evinced their resolution, and raised the spirits of the Americans—we have formerly taken notice that Mr Martin, governor of North-Carolinas, had been obliged to leave his province and take refuge on board a man of war. Notwithstanding this he did not despair of reducing it again to obedience. For this purpose he applied to the regulators, a daring set of banditti, who lived in a kind
An insurrection in North-Carolina in favour of Britain; 277
kind of independent state; and though considered by
government as rebels, yet had never been molested,
on account of their numbers and known skill in
the use of fire-arms. To the chiefs of these people
commissions were sent, in order to raise some regiments;
and a Colonel Macdonald was appointed to command
them. In the month of February he erected the king's
standard, flung proclamations, &c. and collected some
forces, expecting to be soon joined by a body of regu-
lar troops, who were known to be shipped from Britain
to act against the southern colonies. The Americans,
sensible of their danger, dispatched immediately what
forces they had to act against the royalists, at the same
time that they diligently exerted themselves to support
these with suitable reinforcements. Their present force
was commanded by General Moore, whose numbers
were inferior to Macdonald; for which reason the lat-
ter summoned him to join the king's standard under
pain of being treated as a rebel. But Moore, being
well provided with cannon, and conscious that nothing
could be attempted against him, returned the compli-
tations, by appointing Colonel Macdonald, that if he
and his party would lay down their arms, and subscribe
an oath of fidelity to congress, they should be treated
as friends; but if they persisted in an undertaking for
which it was evident they had not sufficient strength,
they could not but expect the severest treatment. In
a few days General Moore found himself at the head
of 8000 men, by reason of the continual supplies which
daily arrived from all parts. The royal party amount-
ed only to 2000, and they were destitute of artillery,
which prevented them from attacking the enemy while
they had the advantage of numbers. They were now
therefore obliged to have recourse to a desperate exer-
cition of personal valour; by dint of which they effected
a retreat for near 80 miles to Moore's Creek, within 16
miles of Wilmington. Could they have gained this
place, they expected to have been joined by governor
Martin and General Clinton, who had lately arrived
with a considerable detachment. But general Moore
with his army pursuied them so close, that they were
obliged to attempt the passage of the creek itself, tho'
not a considerable body of the Americans, under the com-
mand of Colonel Caswell, with fortifications well plan-
ted with cannon, was posted on the other. On attempt-
ing the creek, however, it was found not to be forda-
able. They were obliged therefore to cross over a wood-
en bridge, which the provincials had not time
to destroy entirely. They had, however, by pulling
up part of the planks, and greasing the remainder in or-
der to render them slippery, made the passage so dif-
ficult, that the royalists could not attempt it. In this situa-
tion they were, on the 27th of February, attacked by
general Moore with his superior army, and totally de-
feated with the loss of their general and most of their
leaders, as well as the best and bravest of their men.
Thus was the power of the Americans established in
North-Carolina. Nor were they left successful in the
province of Virginia; where Lord Dunmore having
long continued an useless predatory war, was at last driv-
en from every creek and road in the province. The
people he had on board were dirstressed to the highest
degree by confinement in small vessels. The heat of
the season, and the numbers crowded together, pro-
duced a pestilential fever, which made great havoc,
especially among the blacks. At last, finding them-
welves in the utmost hazard of perishing by famine as
well as disease, they set fire to the least valuable of
their vessels, referring only about 50 for themselves,
in which they bid a final adieu to Virginia, some sail-
ing to Florida, some to Bermuda, and the rest to the
West-Indies.
In South-Carolina the Americans had a more for-
midable enemy to deal with. At Cape Fear a junc-
tion was formed between Sir Henry Clinton, and
Sir Peter Parker, the latter of whom had failed with
his squadron directly from Europe. They concluded
to attempt the reduction of Charleston as being, of
all places within the line of their instructions, the
object at which they could strife with the greatest
prospect of advantage. They had 2,800 land forces,
which they hoped, with the co-operation of their ship-
ning, would be fully sufficient.
For some months past every exertion had been made
British arm-
to put the colony of South-Carolina, and especially its
permanent capital Charleston, in a respectable posture of defence.
In subervency to this view, works had been erected
on Sullivan's island, which is situated for near the chan-
nel leading up to the town, as to be a convenient post
for annoying vessels approaching it.
Sir Peter Parker attacked the fort on that island with
two fifty gun ships, the Biflot and Experiment, four
frigates, the Aricle, Acteon, Solebay and Syren, each
of 28 guns. The Sphinx of 20 guns, the Frienship
armed vessel of 22 guns, Ranger sloop, and Thunder
bomb, each of 8 guns. On the fort were mounted 26
cannon, 26, 18 and 9 pounders. The attack commenced
between ten and eleven in the forenoon, and was
continued upwards of ten hours. The garrison
consisting of 275 regulars and a few militia, under the
command of Colonel Moultrie, made a most gallant de-
ference. They fired deliberately, for the most part took
aim and seldom missed their object. The ships were torn
almost to pieces, and the killed and wounded on board
exceeded 200 men. The loss of the garrison was only
ten men killed and 22 wounded. The fort being built
of palmetto was little damaged. The shot which struck
it were ineffectually buried in its soft wood. General
Clinton had some time before the engagement, landed
with a number of troops on Long island, and it was ex-
pected that he would have co-operated with Sir Peter
Parker, by crossing over the narrow passage, which di-
vides the two islands, and attacking the fort in its un-
shipped rear; but the extreme danger to which he must
unavoidably have exposed his men, induced him to de-
cline the perilous attempt. Colonel Thomson with 7
or 800 men was stationed at the east-end of Sullivan's
island to oppose their crossing. No serious attempt
was made to land either from the fleet or the detachment
commanded by Sir Henry Clinton. The firing ceased
in the evening, and soon after the ships slipped their
anchor. Before morning they had retired about two
miles from the island. Within a few days more the
troupes re-embarked and sailed from New-York. The
thanks of congress were given to General Lee, who
had been sent on by congress to take the command in
Carolina, and also to Colonels Moultrie and Thomson,
for their good conduct on this memorable day. In
compliment to the commanding officer the fort from
that time was called Fort Moultrie.
This year also, the Americans, having to frequently
made trial of their valour by land, became desirous of
trying
The time, however, was now come when the fortitude and patience of the Americans were to undergo a severe trial. Hitherto they had been on the whole successful in their operations: but now they were doomed to experience misfortune, misery, and disappointment; the enemy over-running their country, and their own armies not able to face them in the field. The province of New-York, as being the most colony, and most accessible by sea, was selected upon for the object of his expedition. The force sent against it consisted of 6 ships of the line, 30 frigates, besides other armed vessels, and a vast number of transports. The fleet was commanded by Lord Howe, and the land forces by his brother General Howe, who was now at Halifax. The latter, however, a considerable time before his brother arrived, had set sail from Halifax, and lay before New-York, but without attempting to commence hostilities until he should be joined by his brother. The Americans had, according to custom, fortified New-York and the adjacent islands in an extraordinary manner. However, General Howe was suffered to land his troops on Staten Island, where he was soon joined by a number of the inhabitants. About the middle of July, Lord Howe arrived with the grand armament; and being one of the commissioners appointed to receive the submission of the colonists, he published a circular letter to this purpose to the several governors who had lately been expelled from their provinces, directing them to make the best of their escape, and that the powers they had exercised in the shape of civil government, were to be exercised by parliament, as public as possible. Here, however, congresses saved him trouble, by ordering his letter and declaration to be published in all the newspapers, "That every one might see the invidiousness of the British ministry, and that they had nothing to trifle with besides the exertion of their own valor."  

Lord Howe next sent a letter to General Washington; but as it was directed "To George Washington, Esq." the General refused to accept of it, as not being directed in the style fitful to his station. To obviate this objection, Adjutant-general Parker was sent with another letter, directed "To General Washington, &c. &c." But though a very polite reception was given to the bearer, General Washington utterly refused the letter; nor could any explanation of the adjutant induce him to accept of it. The only interesting part of the conversation was that relating to the powers of the commissioners, of whom Lord Howe was one. The adjutant told him, that these powers were very extensive; that the commissioners were determined to exert themselves to the utmost, in order to bring about a reconciliation; and that he hoped the General would consider this visit as a step towards it. General Washington replied, that it did not appear that these powers consisted in any thing else than granting pardons; and as America had committed no offence, she asked no forgiveness, and was only defending her unquestionable rights.

The decision of every thing being now by consent of both parties left to the sword, no one was left to commence hostilities. However, Lord Howe next sent a letter to General Washington, who had lately been expelled from their provinces, ordering his letter and declaration to be published in all the newspapers. The adjutant told him, that these powers had ordered the papers to be secured by large detachments, which was executed as if to make a show; but one of the utmost importance, that lay at a distance, was entirely neglected. This gave an opportunity to a large body of troops under Lord Percy and Clinton to pass the mountains and attack the Americans in the rear, while they were engaged with the Hessians in front. Through this piece of negligence their defeat became inevitable. Those who were engaged with the Hessians first perceived their mistake, and began a retreat towards their camp; but the passage was intercepted by the British troops, who drove them back into the woods. Here they were met by the Hessians; and thus they were for many hours slaughtered between the two parties, no way of escape remaining but by breaking through the British troops, and thus regaining their camp. In this attempt many perished; and the right wing, engaged with General Grant, shared the same fate. The victory was complete; and the Americans lost on this fatal day (August 27th) upwards of 1000 men, and two generals; several officers of distinction were made prisoners, with a number of private. Among the slain, a regiment consisting of young gentlemen of fortune in Maryland, was almost entirely cut in pieces, and of the survivors not one escaped without a wound.

The ardour of the British troops was now so great, that they could scarce be restrained from attacking the lines of the provincials; but for this there was no occasion, as it was certain the Indians could not be defended. The British and Hessians about 450 were lost in this engagement. As none of the American commanders thought it proper to risk another attack, it was resolved to abandon their camp as soon as possible. Accordingly, on camp in the night of the 20th of August, the whole of the continental troops were ferried over with the utmost secrecy and silence; so that in the morning the Briti had nothing to do but take possession of the camp and what artillery they had abandoned.

This victory, though complete, was very far from being so decisive as the conquerors imagined. Lord Howe, supposing that it would be sufficient to intimidate the congress into some terms, sent General Sullivan, with a view to have been taken prisoner, in the letter, to concur, &c.
America, congress, with a message, importing, that though he could not consistently treat with them as a legal assembly, yet he would be very glad to confer with any of the members in their private capacity; setting forth at the same time the nature and extent of his powers as commissioner. But the congress were not so humbled as to derogate in the least from the dignity of character they had assumed. They replied, that the congress of the free and independent states of America could not consistently fend any of its members in another capacity, than that which they had publicly assumed; but as they were extremely devout of restoring peace to their country upon equitable conditions, they would appoint a committee of their body to wait upon him, and learn what proposals he had to make. This produced a new conference. The committee appointed by congress was composed of Dr. Franklin, Mr. Adams, and Mr. Rutledge. They were very politely received by his Lordship; but the conference proved as fruitless as before independency had been declared; and the last answer of the deputies was, that they were extremely willing to enter into any treaty with Great Britain that might conduce to the good of both nations, but that they would not treat in any other character than that of independent states. This positive declaration instantly put an end to all hopes of reconciliation; and it was resolved to prosecute the war with the utmost vigour. Lord Howe, after publishing a manifesto, in which he declared the refusal of congress, and that he himself was willing to confer with all well disposed persons about the means of restoring public tranquillity, set about the most proper methods for reducing the city of New-York. Here the provincial troops were posted, and from a great number of batteries kept continually annoying the British shipping. The East River lay between them, of about 1200 yards in breadth, which the British troops were extremely diligent of passing. At last, the ships having, after an incessant cannonade of several days, silenced the most troublesome batteries, a body of troops was sent up the river to a bay, about three miles distant, where the fortifications were less strong than in other places. Here, having driven off the provincials by the cannon of the fleet, they marched directly towards the city; but the Americans finding that they should now be attacked on all sides, abandoned the city, and retired to the north of the island, where their principal force was collected. In their passage thither they skirmished with the British, but carefully avoided a general engagement; and it was observed that they did not behave with that ardour and impetuous violence which had hitherto marked their character. The British and provincial armies were not now above two miles distant from each other. The former lay encamped from shore to shore for an extent of two miles, being the breadth of the island, which, though 15 miles long, exceeds not two in any part in breadth. The provincials, who lay directly opposite, had strengthened their camp with many fortifications; at the same time being masters of all the passes and defiles between the two camps, they were enabled to defend themselves against an army much more numerous than their own, and they had also strongly fortified King's-Bridge, whence they could secure a passage to the continent in case of any misfortune. Here General Wash-
with this further advantage, that the American fleet under commodore Hopkins was obliged to fail as far as possible up the river Providence, and thus remained entirely useless.

The same ill success continued to attend the Americans in other parts. After their expulsion from Canada, they had crossed the Lake Champlain, and taken up their quarters at Crown-Point, as we have already mentioned. Here they remained for some time in safety, as the British had no vessels on the lake, and consequently general Burgoyne could not pursue them. To remedy this deficiency, there was no possible method, but either to construct vessels on the spot, or take to pieces some vessels already constructed, and drag them up the river into the lake. This, however, was effected in no longer a space than three months; and the British general, after incredible toil and difficulty, saw himself in possession of a greater number of vessels, by which means he was enabled to pursue his enemies, and invade them in his turn. The labour undergone at this time by the sea and land forces must indeed have been prodigious; since there were conveyed over land, and dragged up the rapids of St Lawrence, no fewer than thirty large long-boats, 400 bateaux, besides a vast number of flat-bottomed boats, and a gondola of 30 tons. The intent of the expedition was to push forward, before winter, to Albany, where the army would take up its winter-quarters, and next spring effect a junction with that under general Howe, when it was not doubted that the united force and skill of these two commanders would speedily put a period to the war.

By reason of the difficulties with which the equipment of this fleet had been attended, it was the beginning of October before the expedition could be undertaken. It was now, however, by every judge, allowed to be completely able to answer the purpose for which it was intended. It consisted of one large vessel with three masts, carrying 18 twelve-pounders; two schooners, the one carrying 14, the other 12 fix pounders; a large flat-bottomed radeau with fix twenty-four and twelve-pounders, and a gondola with 8 nine-pounders. Besides these, were 20 vessels of a smaller size, called gun-boats, carrying each a piece of brafs ordnance from nine to twenty-four pounders, or howitzers. Several long-boats were fitted out in the same manner; and besides all these, there was a vast number of boats and tenders of various sizes to be used as transports for the troops and baggage. It was manned by a number of feld officers, and the guns were to be served by a detachment from the corps of artillery; the officers and soldiers appointed for this expedition were also chosen out of the whole army.

To oppose this formidable armament, the Americans had only a very inconsiderable force, commanded by general Arnold; who, after engaging part of the British fleet for a whole day, took advantage of the darkness of the night to fer with being perceived, and the next morning was out of sight; but he was so hotly pursued by the British, that on the second day after, he was overtaken, and forced to a second engagement. In this he behaved with great gallantry; but his force being very inferior to that of the enemy, he was obliged to run his ships ashore and set them on fire. A few only escaped to lake George; and the garrison of Crown-Point having destroyed or carried off everything of value, retired to Ticonderoga. Thither general Carleton intended to have pursued them; but the difficulties he had to encounter appeared so many and so great, that it was thought proper to march back to Canada, and defer from any further operations till next spring.

Thus the affairs of the Americans seemed every where going to wreck; even those who had been most rieux alangue in their cause began to waver. The time, most ec- also, for which the soldiers had enlisted themselves was now expired; and the bad success of the pre- pered campaign had been so very discouraging, that no person was willing to engage himself during the continuance of a war of which the event seemed to be so doubtful. In consequence of this, therefore, general Washington found his army daily decreasing in strength; so that, from 50,000, of which it consisted when general Howe landed on Staten Island, a tenth part could now be mustered. To satisfy the chief commander as much as possible, general Lee had collected a body of forces in the north; but on his way southward, having imprudently taken up his lodgings at some distance from his troops, information was given to colonel Harcourt, who happened at that time to be in the neighbourhood, and Lee was made prisoner. General The lots of this general was much regretted, the more Lee was taken especially as he was of superior quality to any prisoner in the possession of the colonists, and could not therefore be exchanged. Six field-officers were offered in exchange for him, and refused; and the congress was highly irritated at its being reported that he was to be treated as a deserter, having been a half-pay officer in the British service at the commencement of the war. In consequence of this they issued a proclamation, threatening to retaliate on the prisoners in their possession whatever punishment would be inflicted on any of those taken by the British, and especially that their conduct should be regulated by the treatment of general Lee.

In the mean time they proceeded with the most in- Continences, engaged diligence to recruit their army, and bound their soldiers to serve for a term of three years, or for 1777 during the continuance of the war. The army was divided for the ensuing campaign, was to consist of 80 battalions; of which each province was to contribute its quota; and 20 dollars were offered as a bounty to each soldier, besides an allotment of lands at the end of the war. No lands were promised to those who enlisted only for three years. All officers or soldiers disabled through wounds received in the service were to enjoy half-pay during life. To defray the expence, congresses borrowed five millions of dollars at five per cent., for the payment of which the United States became surety. At the same time, in order to animate the people to vigorous exertions, a declaration was published, in which they set forth the necessity there was for taking proper methods to infure success in their cause: they endeavoured to palliate as much as possible the misfortunes which had already happened; and represented the true cause of the present difficulties to be the short term of enlistment.

This declaration, together with the imminent dan- of Philadelphia, determined the Americans to ex- general to the utmost in order to reinforce ge-
troops, consisting of three regiments under the com-
mand of Col. Mawhood, who were on their march to Princeton; Trenton. With the centre the enemy en-
gaged, and after killing 60, wounding many, and tak-
ing 300 prisoners, obliged the rest to make a precipi-
tate escape, some towards Trenton, and others in a re-
trograde route to Brunswick. The losses of the Americans was inconsiderable in point of numbers; but the fall of the amiable General Mercer rendered it important. And tre-
The British astonished and discouraged at the success treat
and spirit of these repeated enterprizes, abandoning Brunswick,
both Trenton and Princeton, retreated to Brunswick;
while the triumphant Americans retired to Morris-
town. General Washington, however, omitted no op-
portunity of recovering what had been lost; and by
dividing his army into small parties, which could be
reunited on a few hours warning, he in a manner en-
tirely covered the country with it, and repulsed him-
sfelf of all the important places.

Thus ended the campaign of 1776, with scarce any other real advantage than the acquisition of the city of New York, and of a few fortresses in its neighbour-
hood; where the troops were constrained to act with as much circumspection as if they had been be-
fieged by a victorious army, instead of being them-
selves the conquerors.

The army at New-York began in 1777 to exert Excursions
a kind of predatory war, by sending our parties to de-
froy magazines, make incursions, and take or destroy tith from
such forts as lay on the banks of rivers, to which their great command of shipping gave them access. In this
they were generally successful: the provincial maga-
azines at Peck's Hill, a place about 50 miles distant from New-York, were destroyed, the town of Dan-
bury in Connecticut burnt, and that of Ridgefield in the same province was taken possession of. In returning
from the last expedition, however, the British were

Greatly harassed by the Americans under Generals Ar-
old, Wooster, and Sullivan; but they made good their retreat, though with the loss of above 200 killed and
wounded. On the American side the loss was con-

iderable: General Wooster was killed, and Arnold
in the most imminent danger. On the other hand,
the Americans destroyed the fires at Stagg-harbour,
in Long-Island, and made prisoners of all who defend-
d the place.

As this method of making war, however, could an-
swer but little purpose, and favoured more of the bar-
barous incursions of savages than of a war carried on by
a civilized people, it was resolved to make an attempt
on Philadelphia. At first it was thought that this
could be done through the Jerseys; but the cruelties exer-
cised by the British plundering parties had excited no

general an abhorrence, and General Washington had
The army had received such large reinforcements, and polled himself so strongly, that it was found to be impracticable. Many sharps were used to draw him from his strong situation, but without success; so that it was found necessary to make the attempt on Philadelphia by sea. While the preparations necessary for this expedition were going forward, the Americans found means to make amends for the capture of General Lee by that of General Prefcot, who was feized in his quarters with his aid de camp, in much the same manner as General Lee had been. This was exceedingly mortifying to the General himself, as he had not long before set a prize upon General Arnold, by offering a sum of money to any one that apprehended him; which the latter answered by setting a lower price upon General Prefcot.

The month of July was far advanced before the preparations for the expedition against Philadelphia were completed; and it was the 23d before the fleet was able to sail from Sandy-Hook. The force employed in this expedition consisted of 56 battalions of British and Hessian, a regiment of light horse, and a body of loyalists sallied at New-York. The remainder of these, with 17 battalions, and another body of light horse, were sallioned at New-York under Sir Henry Clinton. Seven battalions were sallioned at Rhode-Island. After a week's falling they arrived at the mouth of the Delaware; but there having received certain intelligence, that the navigation of the river was so effectually obstructed, that no possibility of forcing a passage remained; or more probably that Gen. Washington had marched within a short distance of Philadelphia; it was resolved to proceed further southward to Chesapeake Bay in Maryland, from whence the distance to Philadelphia was not very great, and where the provincial army would find less advantage from the nature of the country than in the Jerseys.

The navigation from Delaware to Chesapeake took up the best part of the month of August, and that up the bay itself was extremely difficult and tedious. At last, having failed up the river Elk, as far as was practicable, the troops were landed without opposition, and set forward on their intended expedition. On the news of their arrival at Chesapeake, General Washington left the Jerseys, and hastened to the relief of Philadelphia; and in the beginning of September met the royal army at Brandywine Creek about mid-way, between the head of the Elk and Philadelphia. Here he adhered to his former method of skirmishing and harrying the royal army on its march; but as this proved insufficient to stop its progress, he retired to that side of the creek next to Philadelphia, with an intent to dispute the passage. This brought on a general engagement on the 11th September. The royal army advanced at day break in two columns, commanded by lieutenant general Knyphausen, and by lord Cornwallis. The first took the direct road to Chafford's Ford, and made a show of paling it, in front of the main body of the Americans. At the same time the other column moved up on the west side of the Brandywine to its fork, and crossed both its branches about 2 o'clock in the afternoon, and then marched down on the east side thereof, with the view of turning the right wing of their adversaries.

This they effected and compelled them to retreat with great loss. General Knyphausen amused the Americans with the appearance of crossing the ford, but did not attempt it until lord Cornwallis having crossed above and moved down on the opposite side, had commenced his attack. Knyphausen then crossed the ford, and attacked the troops posted for its defence. These, after a severe conflict, were compelled to give way. The retreat of the Americans soon became general, and was continued to Chester, under cover of General Weedon's brigade, which came off in good order. The final issue of battles often depends on small circumstances, which human prudence cannot control—one of these occurred here, and prevented General Washington from executing a bold design, to effect which, his troops were actually in motion. This was to have crossed the Brandywine, and attacked Knyphausen, while general Sullivan and Lord Stirling, should keep earl Cornwallis in check. In the most critical moment, general Washington received intelligence which he was obliged to credit, that the column of lord Cornwallis had been only making a feint, and was returning to join Knyphausen. This prevented the execution of a plan, which, if carried into effect, would probably have given a different turn to the events of the day. The killed and wounded in the royal army, were near six hundred. The loss of the Americans was twice that number. The celebrated Marquis de la Fayette here first blazed in the cause of liberty, which he had espoused with enthusiasm. His wound was slight, but it endeared him to the Americans.

The loss of this battle proved also the loss of Philadelphia. General Washington retired towards Lancaster, to save the stores which had been deposited at Reading. But though he could not prevent the loss of Philadelphia, he still adhered to his original plan of dispersing the royal party, by laying ambuscades and cutting off detached parties; but in this he was less successful than formerly; and one of his one detachments which lay in ambush in a wood were themselves surprised and entirely defeated, with the loss of 500 killed and wounded, besides 70 or 80 taken, and all their arms and baggage.

General Howe now perceiving that the Americans would not venture another battle even for the sake of their capital, took peaceable possession of it on the 26th of September. His first care was then to cut it off, by means of strong batteries, the communication between the upper and lower parts of the river; which was executed, notwithstanding the opposition of one American armed vessels; one of which, carrying 36 guns, was taken. His next task was to open a communication with it by sea; and this was a work of no small difficulty. A vast number of batteries and forts had been erected, and immense machines formed like chevaux de frise, from whence they took their name, sunk in the river to prevent its navigation. As the fleet was sent round to the mouth of the river in order to co-operate with the army, this work, however difficult, was accomplished; nor did the provincials give much opposition, as well knowing that all places of this kind were now untenable. General Washington, however, took the advantage of the royal army being divided to attack the camp of the principal division of that lay at German town, in the neighborhood of Philadelphia. In this he met with very little success; for though he reached the place of de-
The British ships of war burnt.

Through this passage, the Vigilant, a large ship, cut down so as to draw but little water, mounted with 4 pounders, made her way to a position from which she might enfilade the works on Mud-Island. This gave the British such an advantage, that the post was no longer tenable. Colonel Smith, who had with great gallantry defended the fort from the latter end of September, to the 11th of November, being wounded, was removed to the main. Within five days after his removal, major Thayer, who as a volunteer had nobly offered to take charge of this dangerous post, was obliged to evacuate it.

This event did not take place till the works were entirely beat down—every piece of cannon dismounted, and one of the British ships so near that she threw grenades into the fort, and killed the men uncovered on the platform. The troops who had so bravely defended fort Millin, made a safe retreat to Red-Bank. Congress voted swords to be given to lieutenant colonel Smith and Commodore Hazlewood, for their gallant defence of the Delaware. Within three days after Mud-Island was evacuated, the garrison was also withdrawn from Red-Bank, on the approach of lord Cornwallis, at the head of a large force prepared to assault it. Some of the American galleys and armed vessels escaped by keeping close in with the Jersey shore, to places not then occupied by Philadelphians, but 17 of them were abandoned by their crews, and fired. Thus the British gained a free communication between their army and shipping. This event was to them very desirable. They had been previously obliged to draw their provisions from Chester, a distance of sixteen miles, at some risque, and a certain great expence. The long protracted defence of the Delaware, deranged the plans of the British, for the remainder of the campaign, and consequentlv favored the adjacent country.

Thus the campaign of 1777, in Pennsylvania, concluded, upon the whole, successfully on the part of the British. In the north, however, matters wore a different aspect. The expedition in that quarter had been projected by the British ministry as the most effectual method that could be taken to crush the colonies at once. The four provinces of New-England had originally begun the confederacy against Britain, and were still considered as the most active in the continuation of it; and it was thought, that any impression made upon them, would contribute to an effectual manner to the reduction of all the rest. For this purpose, an army of 4000 chosen British troops and 3000 Germans were put under the command of General Burgoyne; General Carleton was directed to use his interest with the Indians to persuade them to join in this expedition; and the province of Quebec was to furnish large parties to join in the same. The officers who commanded under General Burgoyne were, General Philips of the artillery, Generals Fraer, Powell, and Hamilton, with the German officers General Reidefel and Speechelt. The soldiers, as has already been observed, were all excellently disciplined, and had been kept in their winter-quarters with all imaginable care, in order to prepare them for the expedition on which they were going. To aid the principal expedition, another was projected on the Mohawk River under Colonel St Leger, who was to be assisted by Sir John Johnson, son to the
the famous Sir William Johnson who had so greatly distinguished himself in the war of 1755.

On the 21st of June 1777, the army encamped on the western side of the Lake Champlain; where, being joined by a consider able body of Indians, General Burgoyne made a speech, in which it is said he exhorted these new allies, but ineffectually, to lay aside their fer rocious and barbarous manner of making war; to kill only such as opposed them in arms; and to spare prisoners, with such women and children as should fall into their hands. After issuing a proclamation, in which the force of Britain, and that which he commanded, was set forth in very ostentatious terms, the campaign opened with the siege of Ticonderoga. The place was very strong, and garrisoned by 6000 men under General St Clair; nevertheless, the works were so extensive, that even this number was scarce sufficient to de fend them properly. They had therefore omitted to fortify a rugged eminence called Sugar-Hill, the top of which overlooked and effectually commanded the whole works; imagining, perhaps, that the difficulty of the ascent would be sufficient to prevent the enemy from taking possession of it. On the approach of the first division of the army, the provincials abandoned and set fire to their outworks; and so expeditious were the British troops, that by the 5th of July every post was secured which was judged necessary for invuling it completely. A road was soon after made to the very summit of that eminence which the Americans had supposed could not be ascended; and so much were they now disheartened, that they instantly abandoned the fort entirely, taking the road to Skeneborough, a place to the south of Lake George; while their baggage, with what artillery and military stores they could carry off, were sent to the same place by water. But the British generals were determined not to let them pass so easily. Both were pursued and both overtaken. Their armed vessels consisted only of five galleys; two of which were taken, and three blown up; on which they set fire to their boats and fortifications at Skeneborough. On this occasion the provincials lost 200 boats, 130 pieces of cannon, with all their provisions and baggage. Their land-forces under Colonel Francis made a brave defence against General Fraser; and superior in number, had almost overpowered him, when General Reidel, with a large body of Germans came to his assistance. The provincials were now overpowered in their turn; and their commander being killed, they fled on all sides with great precipitation. In this action 200 Americans were killed, as many taken prisoners, and above 600 wounded, many of whom perished in the woods for want of assistance.

During the engagement General St Clair was at Cafileton, about six miles from the place; but instead of going forward to Fort Anne, the next place of strength, he repaired to the woods which lie between that fortres and New-England. General Burgoyne, however, detached Colonel Jull with the ninth regiment in order to intercept such as should attempt to retreat towards Fort Anne. On his way he met with a body of the Americans more numerous than his own; but after an engagement of three hours, they were obliged to retire with great loss. After so many disasters, despairing of being able to make any stand at Fort Anne, they set fire to it and retired to Fort Edward. In all these engagements the loss of killed and wounded in the royal army did not exceed 200 men.

General Burgoyne was now obliged to suspend his operations for some time, and wait at Skeneborough for the arrival of his tents, provisions, &c. He employed this interval in making roads through the country about St Anne, and in clearing a path for his troops to proceed against the Americans. This was attended with incredible toil, but all obstructions were surmounted with equal patience and resolution by the army. In the course of this exertion, he arrived with his army before Fort Edward about the end of July. Here General Schuyler had been for some time endeavoring to recruit the scattered American forces, and had been joined by General St Clair with the remains of his army; the garrison of Fort George also, situated on the lake of that name, had evacuated the place and retired to Fort Edward.

But on the approach of the royal army, they received from thence also, and formed their head-quarter to return to Saratoga. Notwithstanding the great successes of the British general, they showed not the least disposition to yield, but seemed only to encourage the New-Englanders, and they might make the most effectual resistance. For this purpose, the militia was every where raised and draughted to join the army at Saratoga; and such numbers of volunteers were daily added, that they soon began to recover from the alarm into which they had been thrown. That they might have a commander whose abilities could be relied on, General Arnold was appointed, who repaired to Saratoga with a considerable train of artillery; but receiving intelligence that Colonel St Leger was proceeding with great rapidity in his expedition on the Mohawk River, he removed to Stillwater, a place about half way between Saratoga and the junction of the Mohawk and Hudson's River.

The Colonel, in the mean time, had advanced as far as Fort Stanwix, the siege of which he pressed with vigour. On the 6th of August, understanding that a supply of provisions, escorted by 800 or 900 men, was on the way to the fort, he dispatched Sir John Johnson with a strong detachment to intercept it. This he did so effectually, that, besides intercepting the provisions, 400 of its guard were slain, 200 taken, and the rest escaped with great difficulty. The garrison, however, were not to be intimidated by the threats or representations of the Colonel; on the contrary, they made several successful sallies under Colonel Willert, the second in command; and this gentleman, in company with another, even ventured out of the fort, and, eluding the vigilance of the enemy, passed through them in order to hasten the march of General Arnold to their assistance.

Thus the affairs of Colonel St Leger seemed to be in no very favourable situation notwithstanding his late and great success, and they were soon totally ruined by the defection of the Indians. They had been alarmed by the report of General Arnold's advancing with 2000 men to the relief of the fort; and while the Colonel was attempting to give them encouragement, another report was spread, that General Burgoyne had been defeated with great slaughter, and was now flying before the provincials. On this he was obliged to do as they thought proper; and the retreat could not be effectuated without
General Burgoyne, in the mean time, notwithstanding all the difficulties he had already sustained, found that he must fill encounter more. The roads he had made with so much labour and pains were destroyed, either by the wetness of the season or by the Americans; so that the provisions he brought from Fort George could not arrive at his camp without the most prodigal toil. On hearing of the siege of Fort Stanwix by Colonel St Leger, he determined to move forward, in hopes of inclining the enemy betwixt his own army and that of St Leger, or of obtaining the command of all the country between Fort Stanwix and Albany; or, at any rate, a junction with Colonel St Leger would be effected, which could not but be attended with the most happy consequences. The only difficulty was the want of provisions; and this it was proposed to remedy by reducing the provincial magazines at Bennington. For this purpose, Colonel Baum, a German officer of great bravery, was chosen with a body of 500 men. The place was about 20 miles from Hudson's River; and no sooner Colonel Baum's party, the whole army marched up the river's bank, and encamped almost opposite to Saratoga, with the river betwixt it and that place. An advanced party was posted at Batten Kill, between the camp and Bennington, in order to support Colonel Baum. In their way the British seized a large supply of cattle and provisions, which were immediately sent to the camp; but the badness of the roads retarded their march so much, that intelligence of their design was sent to Bennington. Understanding now that the American force was greatly superior to his own, the Colonel acquainted the General, who immediately dispatched Colonel Breyman with a party to his assistance; but through the same causes that had retarded the march of Colonel Baum, this assistance could not arrive in time. General Stark who commanded the American militia at Bennington, engaged with them before the junction of the two royal detachments could be effected. On this occasion about 800 undisciplined militia, without bayonets, or a single piece of artillery, attacked and routed 500 regular troops advantageously posted behind entrenchments — furnished with the belt arms, and defended with two pieces of artillery. The field pieces were taken from the party commanded by Col. Baum, and the greatest part of his detachment was either killed or captured. Colonel Breyman arrived on the same ground and on the same day, but not till the action was over. Instead of meeting his friends, as he expected, he found himself briskly attacked. This was begun by colonel Warner, (who with his continental regiment, which having been sent for from Mancheater, came opportunely at this time) and was well supported by Stark's militia, which had just defeated the party commanded by colonel Baum. Breyman's troops, though fatigued with their preceding march, behaved with great resolution, but were at length compelled to abandon their artillery and retreat. In these two actions the Americans took four brass field pieces, twelve brass drums, 250 dragoon swords, 4 ammunition wagons, and about 700 prisoners. The loss of the Americans, inclusive of their wounded, was about 100 men.
ed with great slaughter, and the loss of all their artillery and baggage.

This was by far the heaviest loss the British army had sustained since the action at Bunker's Hill. The lift of killed and wounded amounted to near 200, exclusive of the Germans; but the greatest misfortune was the Americans had now an opening on the right and rear of the British forces, so that the army was threatened with entire destruction. This obliged General Burgoyne once more to shift his position, that the Americans might also be obliged to alter theirs. This was accomplished on the night of the 7th, without any loss, and all the next day he continued to offer the Americans battle; but they were now too well assured of obtaining a complete victory, by cutting off all supplies from the British, to risk a pitched battle. Wherefore they advanced on the right side, in order to enclose him entirely; which obliged the General to direct a retreat towards Saratoga. But the Americans had now flattened a great force on the ford at Hudson's river, so that the only possibility of retreat was by securing a passage to Lake George; and to effect this, a body of workmen were detached, with a strong guard, to repair the roads and bridges that led to Fort Edward. As soon as they were gone, however, the Americans seemed to prepare for an attack; which rendered it necessary to recall the guard, and the workmen being of course left exposed, could not proceed.

In the mean time, the boats which conveyed provisions down Hudson's river were exposed to the continual fire of the American marksmen, who took many of them; so that it became necessary to convey the provisions over land. In this extreme danger, it was resolved to march by night to Fort Edward, forcing the paffles at the fords either above or below the place; and, in order to effect this the more easily, it was resolved that the soldiers should carry their provisions on their backs, leaving behind their baggage and every other incumbrance. But before this could be executed, intelligence was received that the Americans had raised strong entrenchments opposite to the fords, well provided with cannon, and that they had likewise taken possession of the rising ground between Fort George and Fort Edward, which in like manner was provided with cannon.

All this time the American army was increasing by the continual arrival of militia and volunteers from all parts. Their parties extended all along the opposite bank of Hudson's River, and some had even passed it in order to observe the left movement of the British army. Every part of the British camp was reached by the grape and rifle-shot of the Americans, besides a discharge from their artillery, which was almost incessant. In this state of extreme distress and danger, the army continued with the greatest constancy and perseverance till the evening of the 13th of October, when an inventory of provisions being taken, it was found that no more remained than what were sufficient to serve for three days; and a council of war being called, it was unanimously determined that there was no method now remaining but to treat with the Americans. In consequence of this, a negotiation was opened next day, which speedily terminated in a capitulation of the whole British army; the articles of which were 1. The troops under lieut. gen. Burgoyne, to march out of their camp with the honours of war, and the artillery of the intrenchments to the verge of the river where the old fort stood, where the arms and artillery are to be left. The arms to be piled by word of march, and the officers, &c. 2. A free passage to be granted to the army under lieut. gen. Burgoyne to Great-Britain, upon condition of not serving again in North-America during the present contest; and the port of Boston to be signed for the entry of transports, to receive the troops whenever gen. Howe shall order:—3. Should any cartel take place, by which the army under lieut. gen. Burgoyne, or any part of it, may be exchanged, the foregoing article to be void, as far as such exchange shall be made:—4. The army under lieut. gen. Burgoyne to march to Massachusetts-Bay, by the safest, and most expedient and convenient route; and to be quartered in, near, or as convenient as possible to Boston, that the march of the troops may not be delayed when transports arrive to receive them:—The troops to be supplied on the march, and during their being in quarters, with provisions, by major general Gates's orders, at the same rate of rations as the troops of his own army; and, if possible, the officers horses and cattle are to be supplied with forage at the usual rates:—6. All the officers to retain their carriages, bat-horses and other cattle, and no baggage to be modelled or searched; lieut. gen. Burgoyne giving his honour, that there are no public stores contained therein. Major gen. Gates will of course take the necessary measures for the due performance of this article: should any carriages be wanted during the march, for the transportation of officers baggage, they are, if possible, to be supplied by the country at the usual rates:—7. Upon the march, and during the time the army shall remain in quarters, in the Massachusetts-Bay, the officers are not, as far as circumstances will admit, to be separated from their men.—The officers are to be quartered according to their rank, and are not to be hindered from their assembling their men for roll-callings, and other necessary purposes of regularity:—8. All corps whatever of lieut. gen. Burgoyne's army, whether composed of sailors, bateau-men, artificers, drivers, independent companies, and officers of the army, of whatever country, shall be included in the fullest sense and utmost extent of the above articles, and comprehended in every respect as British subjects:—9. All Canadians, and persons belonging to the Canadian establishment, consisting of sailors, bateau-men, artificers, drivers, independent companies, and many other followers of the army, who come under no particular description, are to be permitted to return there: they are to be conducted immediately, by the shortest route, to the first British port on Lake George, are to be supplied with provisions in the same manner as the other troops, and to be bound by the same condition of not serving during the present contest in North-America:—10. Passports to be immediately granted for three officers, not exceeding the rank of captains, who shall be appointed by lieut. gen. Burgoyne, to carry dispatches to Sir Wm. Howe, Sir Guy Carleton, and to Great-Britain by the way of New-York; and major general Gates engages the public faith, that these dispatches shall not be opened. These officers are to set out immedi-

A M E [ 601 ] A M E.
During the stay of the troops in the Maffachufetts-Bay, the officers are to be admitted on parole, and are to be permitted to wear their side arms:—12. Should the army under lieut. gen. Burgoyne, find it necessary to fend for their clothing and other baggage from Canada, they are to be permitted to do it in the most convenient manner, and necessary parallel or supports to be granted for that purpose:—12. These articles are to be mutually signed and exchanged to-morrow morning at nine o'clock; and the troops under lieut. gen. Burgoyne, are to march out of their intrenchments at three o'clock in the afternoon. Camp at Saratoga, October 16, 1777.

HORATIO GATES, Major-General.

To prevent any doubts that might arise from lieut. gen. Burgoyne's name not being mentioned in the above treaty, major general Gates hereby declares, that he is underfoot to be comprehended in it, as fully as if his name had been specifically mentioned.

Such was the impatience of some of the militia to return home before the royal army had been brought to surrender, and to little their concern to be spectators of the event, that one of the Northampton regiments went off the day before the flag came out from Burgoyne. Another regiment took itself away while the town itself was wantonly reduced to ashes, as that called Continent Village had been before. Thus the British armament spent their time in wasting the adjacent country, when by pushing forward 136 miles in six days they might have effectually relieved Burgoyne.

But these successess, of whatever importance they might be, were now disregarded by both parties. They jealously vowed to irritate the Americans, flushed with their successes; and they were utterly insufficient to raise the spirits of the British, who were now thrown into the utmost dismay.

On the 16th of March 1778, Lord North intimated to the house of commons, that a paper had been laid before the king by the French ambassadoir, intimating the conclusion of an alliance between the court of France and the United States of America. The preliminaries of this treaty had been concluded in the end of the year 1777, and a copy of them sent to congress, in order to counteract any proposals that might be made in the mean time by the British ministry. On the 6th of February 1778, the articles were formally signed, to the great satisfaction of the French nation. They were in substance as follows:

1. If Great-Britain should, in consequence of this treaty, proceed to hostilities against France, the two nations should mutually affit one another.

2. The main end of the treaty was, in an effectual manner to maintain the independency of America.

3. Should those places of North-America still subject to Britain be reduced by the colonies, they should be confederated with them, or subjected to their jurisdiction.

4. Should any of the West Indies be reduced by France, they should be deemed its property.

5. No formal treaty with Great Britain should be concluded either by France or America without the consent of each other; and it was mutually engaged that
that they should not lay down their arms till the inde-
pendency of the States had been formally acknow-
ledged.
6. The contracting parties mutually agreed to invite
those powers that had received injuries from Great
Britain to join the common cause.
7. The United States guaranteed to France all the
possessions in the West Indies which the should con-
quer; and France in her turn guaranteed the absolute
independency of the States, and their supreme author-
ity over every country they poiffessed, or might ac-
quire during the war.

The notification of such a treaty as this could not
be looked upon as a declaration of war. On its
being announced to the house, every one agreed in its
adress to his majesty, promising to stand by him to
the utmost in the present emergency; but it was warm-
ly contended by the members in opposition, that the
present ministry ought to be removed on account of
their numberless blunders and miscarriages in every
instance. Many were of opinion, that the only way
to extricate the nation from its trouble was to
legislate the independency of America at once; and thus
the present was now offered them be

The Americans in the mean time affidiously em-
ployed their agents at the courts of Spain, Vienna,
Prufiia, and Tufcany, in order, if possible, to conclude
alliances with them, or at least to procure an acknow-
ledgment of their independency. As it had been report-
ed that Britain intended to apply for afliance to Rus-
sea, the American commissioners were enjoined to use
their utmost influence with the German princes to
prevent such auxiliaries from marching through their
territories, and to endeavour to procure the recall of
the German troops already sent to America. To
France they offered a cession of such West India is-
lands as should be taken by the united strength of France
and America; and should Britain by their joint en-
deavours be dispossessed of Newfoundland, Cape Breton,
and Nova Scotia, those territories should be divided
between the two nations, and Great Britain be totally
excluded from the fishery. The proposals to the Span-
ish court were, in case they should think pro-
per to espouse their quarrel, the American States
should assist in reducing Penfacaola under the domin-
ion of Spain, provided their subjects were allowed the
free navigation of the river Missilippi and the ufe of the
harbour of Penfacaola; and they further offered, that,
if agreeable to Spain, they would declare war against Portugal, should that power expel the Ameri-
can ships from its ports.

In the mean time the troops under General Bur-
goyne were preparing to embark for Britain accord-
ing to the convention at Saratoga; but congresses having
received information, that many articles of negotia-
tion and accointments had not been forrendered agreeably to the stipulated terms, and finding some
cause to apprehend, that sinister designs were har-
boured on the part of Great Britain to convey these
troops to join the army at Philadelphia or New-York,
positively refused to let them embark, until an expli-
cit ratification of the convention should be properly
notified by the British court.

The season for action was now approaching; and
congresses was indefatigable in its preparations for a
new campaign, which it was confidently said would be the
first. Among other methods taken for this purpose, it
was recommended to all the young gentlemen of the
colonies to form themselves into bodies of cavalry to
serve at their own expense during the war. General
Washington at the same time, to remove all incum-
brances from his army, lightened the baggage as much
as possible, by substituting packs and portmanteaus in
place of cheifs and boxes, and using pack-horses in
stead of waggonis. On the other hand, the British ar-
my, expecting to be reinforced by 20,000 men, thought
of nothing but concluding the war according to their
wishes before the end of the campaign. It was with

The utmost concern, as well as indignation, therefore,
that they received the news of Lord North's conciliatory
bill. It was universally looked upon as a national
dishonor; and some even tore the cockades from their
hats, and trampled them under their feet as a token of
their indignation. By the colonists it was received
with infinence. The British commissioners endeav-
oured to make it as public as possible; and the con-
gress, as formerly, ordered it to be printed in all the
newspapers. On this occasion Governor Tryon in-
closed several copies of the bill to General Washington
in a letter, intreating that he would allow them to be
circulated; to which the General returned for answer
a copy of a newspaper in which the bill was printed,
with the resolutions of congress upon it. Thefe were,
That whoever presumed to make a separate agree-
ment with Britain should be deemed a publif enemy;
that the United States could not with any propriety
keep correspondence with the commissioners until
their independence was acknowledged, and the Brit-
ish fleets and armies removed from America. At the
same time, the colonies were warned not to suffer
themselves to be deceived into security by any offers
that might be made; but to use their utmost endeav-
ours to fend their quotas with all diligence into the
field. The individuals with whom the commissioners
conversed on the subject of the conciliatory bill, gene-
 rally returned for answer, that the day of reconcilia-
tion was past; and that the haughtiness of Britain had
extinguished all filial regard in the breasts of Ame-
cans.

About this time also Mr Silas Dean arrived from
France with two copies of the treaty of commerce
and alliance to be signed by congress. Advices of the
most agreeable nature were also received from various
parts, repreffing in the most favourable light the
dispositions of the European powers; all of whom, it
was said, wished to fee the independency of America
settled upon the most permanent basis. Considering
the situation of matters with the colonists at this time,
therefore, it was no wonder the commissioners found
themselves unable to accomplish the errand on which
they came. Their proposals were utterly rejected,
themselves treated as spies; and, after a vain attempt
by
by governor Johnstone, one of the commissioners, to bribe several members of congress, all intercourse with them was interdicted.

But before any final answer could be obtained from congress, Sir Henry Clinton had taken the resolution of evacuating Philadelphia. Accordingly, on the 10th of June, after having made all necessary preparations, the army marched out of the city and crossed the Delaware before noon with all its baggage and other incumbrances. General Washington, apprised of this design, had dispatched express to the Jerseys with orders to collect all the forces that could be assembled in order to obstruct the march of the enemy. After various movements on both sides, Sir Henry Clinton, with the royal army, arrived on the 27th of June at a place called Freehold; where, judging that the enemy would attack him, he encamped in a very strong situation. Here General Washington determined to make an attack as soon as the army had again begun its march. The night was spent in making the necessary preparations, and General Lee with his division was ordered to be ready by day-break. But Sir Henry Clinton, apprehending that the chief object of the Americans was the baggage, committed it to the care of General Knaphaufen, whom he ordered to set out early in the morning, while he followed with the rear of the army. The attack was accordingly made; but the British general had taken such care to arrange his troops properly, and to effectually support his forces when engaged with the Americans, that the latter not only made no impression, but were with difficulty preferred from a total defeat by the advance of General Washington with the whole army. The British troops effected their retreat in the night with the loss of 300 men, of whom many died through mere fatigue, without any wound. In this action General Lee was charged by General Washington with disobedience and misconduct in retreating before the British army. He was tried by a court-martial, and sentenced to a temporary suspension from his command.

After they had arrived at Sandy-Hook, a bridge of boats was by Lord Howe's directions thrown from thence over the channel which separated the Island from the main land, and the troops were conveyed aboard the fleet; after which they failed to New-York. After finding some light detachments to watch the enemy's motions, General Washington marched towards the North-River, where a great force had been collected to join him, and where it was now expected that some very capital operations would take place.

In the mean time France had sent about her preparations for the assistance of the Americans. On the 14th of April Count d'Eslaign had failed from Toulon, with a strong squadron of ships of the line and frigates, and arrived on the coast of Virginia in the beginning of July, with the British fleet was employed in conveying the forces from Sandy-hook to New-York. It consisted of one ship of 90 guns, one of 80, five of 74, and four of 64, besides several large frigates; and, exclusive of its complement of sailors, had 5000 marines and soldiers on board. To oppose this the British had only six ships of 64 guns, three of 50, and two of 40, with some frigates and sloops. Notwithstanding this inferiority, however, the British admiral posted himself to advantageously, and showed such superior skill, that d'Eslaign did not think proper to attack him; particularly, as the pilots informed him that it was impracticable to carry his large ships over the bar into the hook, and General Washington prefigured him to fail for Newport. He therefore remained at anchor four miles off Sandy-hook till the 22d of July, without effecting anything more than the capture of some vessels, which, through ignorance of his arrival, fell into his hands.

The next attempt of the French admiral was, in conjunction with the Americans, on Rhode-Island. It Rhose was proposed that d'Eslaign, with the 6000 troops he had with him, should make an descent on the southern part of the island, while a body of the Americans should take possession of the north; at the same time the French squadron was to enter the harbour of Newport, and take and destroy all the British shipping. On the 8th of August the French admiral entered the harbour as was proposed, but found himself unable to do any material damage. Lord Howe, however, instantly set sail for Rhode-Island; and d'Eslaign, confiding in his superiority, immediately came out of the harbour to attack him. A violent storm parted the two fleets, and did so much damage that they were rendered totally unfit for action. The French, however, suffered a mort; and several of their ships being afterwards attacked singly by the British, very narrowly escaped being taken. On the 20th of August he returned to Newport in a very shattered condition; and, not thinking himself safe there, failed two days after for Boston. General Sullivan had landed in the mean time on the northern part of Rhode-Island with 10,000 men. On the 17th of August they began their operations by erecting batteries, and making their approaches to the British lines. But General Pigot, who commanded in Newport, had taken such effectual care to secure himself on the land-side, that without the assistance of a marine force it was altogether impossible to attack him with any probability of success. The conduct of d'Eslaign, therefore, who had abandoned them when master of the harbour, gave the greatest disgust to the people of New-England, and Sullivan began to think of a retreat. On perceiving his intentions, the garrison fallied out upon him with so much vigour, that it was not without difficulty that he effected his retreat. He had not been long gone when Sir Henry Clinton arrived with a body of 4000 men; which, had it arrived sooner, would have enabled the British commander to have gained a decisive advantage over him, as well as to have destroyed the town of Providence, which, by its vicinity to Rhode-Island, and the enterprises which were continually projected and carried on in that place, kept the inhabitants of Rhode-Island in continual alarms.

The first British expedition was to Buzzard's-Bay, The coast on the coast of New-England and neighbourhood of America. Here they destroyed a great number of vessels by privateers and merchantmen, magazines, with forresses, &c.; whence proceeding to a fertile and populous island, called Martha's-Vineyard, they carried off 2000 sheep and 300 black cattle. Another expedition took place up the North-River, under Lord Cornwallis and General Knaphaufen; the principal event of which was, the destruction of a regiment of American cavalry known by the name of Washington.
York; while General Lin-coin's Light Horse. A third expedition was directed to Little Egg-Harbour in New-Jersey, a place noted for privaters, the destruction of which was its principal intention. It was conducted by Captains Ferguson and Collins, and ended in the destruction of the American vessels, as well as of the place itself. At the same time part of another body of American troops, called Pulaski's legion, was surprized, and a great number of them put to the sword.

The Americans had in the beginning of the year projected the conquest of West-Florida; and one Captain Willing, with a party of resolute men, had made a successful incursion into the country. This awakened the attention of the British to the southern colonies, and an expedition against them was resolved on. Georgia was the place of definition; and the more efficient force, under convoy of some ships of war, commanded by Commodore Hyde Parker, embarked at New-York; while General Prevost, who commanded in East-Florida, was directed to set out with all the force he could spare. The armament from New-York arrived off the coast of Georgia in the month of December; and though the Americans were very strongly posted in an advantageous situation on the shore, the British troops made good their landing, and advanced towards Savannah the capital of the province. That very day they defeated the force of the provincials which opposed them; and took possession of the town with such celerity, that the Americans had not time to execute a resolution they had taken of setting fire on it. In ten days the whole province of Georgia was reduced, Sunbury alone excepted; and this was also brought under subjection by General Prevost in his march northward. Every proper method was taken to secure the tranquillity of the country; and rewards were offered for apprehending committee of Grievances. The provincial assembly, which was assembled, was dismissed, and a chosen body of infantry, mounted on horseback, the command of the troops naturally devolved on him as the senior officer; and the conquest of Carolina was next projected.

In this attempt there was no small probability of success. The country contained a great number of friends to government, who now eagerly embraced the opportunity of declaring themselves; many of the inhabitants of Georgia had joined the royal standard; and there was not in the province any considerable body of provincial forces capable of opposing the efforts of regular and well-disciplined troops. On the 1st of June, General Prevost's approach, the loyalists assembled in a body, imagining themselves able to stand their ground until their allies should arrive; but in this they were disappointed. The Americans attacked and defeated them with the loss of half their number. The remainder retreated into Georgia; and after undergoing many difficulties, at last effected a junction with the British forces.

The town of Charleston, taken by the British, was opened; the American general Prevost therefore determined to dislodge the party at Briar's Creek; and the latter, trudging to their strong situation, and being remiss in their guard, suffered themselves to be surprized on the 30th of March 1779; when they were utterly vanquished; the loss of more than 300 killed and taken, besides a great number drowned in the river or the swamps. The whole artillery, stores, baggage, and almost all the arms of this unfortunate party were taken, so that they could no more make any stand; and thus the province of Georgia was once more freed from the Americans, and a communication opened with those places in Carolina where the loyalists chiefly resided.

The victory at Briar's Creek proved of considerable service to the British cause. Great numbers of the loyalists joined the army, and considerably increased its force. Hence he was enabled to stretch his policy further up the river, and to guard all the principal passes: so that General Lincoln was reduced to a state of inaction; and at last moved off towards Augusta, in order to protect the provincial assembly, which was obliged to sit in that place, the capital being now in the hands of the British.

Lincoln had no sooner quitted his post, than it was judged a proper time by the British general to put in execution the grand scheme which had been meditated against Carolina. Many difficulties indeed lay in his way. The river Savannah was fo swollen by the ex- ceedingly rains of the season, that it seemed impassable; the opposite shore, for a great way, was so full of swamps and marshes, that no army could march over it without the greatest difficulty; and, to render the passage still more difficult, General Moultrie was left with a considerable body of troops in order to oppose the enemy's attempts. But in spite of every opposition, the con- stancy, perseverance, and perseverance of the British troops at last prevailed. General Moultrie was obliged to retire to- wards Charleston; and the pursuing army, after hav- ing passed through the marshes for some time, at last arrived in an open country, through which they pur- sued their march with great rapidity, towards the capital; while General Lincoln made preparations to march to its relief.

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In the mean time, General Lincoln, with a considerable body of American troops, had encamped within 20 miles of the town of Savannah; and another strong party had posted themselves at a place called Briar's Creek, farther up the river of the same name. Thus the extent of the British government was likely to be circumscribed within very narrow bounds. General Lincoln therefore determined to dislodge the party at Briar's Creek; and the latter, trudging to their strong situation, and being remiss in their guard, suffered themselves to be surprized on the 30th of March 1779; when they were utterly vanquished; the loss of more than 300 killed and taken, besides a great number drowned in the river or the swamps. The whole artillery, stores, baggage, and almost all the arms of this unfortunate party were taken, so that they could no more make any stand; and thus the province of Georgia was once more freed from the Americans, and a communication opened with those places in Carolina where the loyalists chiefly resided.

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port his attack by land; and General Lincoln advancing rapidly with a superior army, threatened to include him between his own force and the town; so that should he fail in his first attempt, certain destruction would be the consequence. For these reasons he withdrew his forces from before the town, and took possession of two islands, called St. James's and St. John's, lying to the southward; where having waited some time, his force was augmented by the arrival of two frigates. With these he determined to make himself master of Port-Royal, another island possessed of an excellent harbour, and many other natural advantages, from its situation also commanding all the sea-coast from Charleston to Savannah River. The American general, however, did not allow this to be accomplished without opposition. Perceiving that his opponent had occupied an advantageous post on St. John's island preparatory to his enterprise against Port-Royal, he attempted, on the 20th of June, to dilodge them from it, but, after an obstinate attack, the provincials were obliged to retire with considerable loss. On this occasion the success of the British arms was in a great measure owing to an armed flote, which galled the right flank of the enemy so effectually, that they could direct their efforts only against the strongest part of the lines, which proved impregnable to their attacks. This disappointment was infantly followed by the loss of Port-Royal, which General Prevost took possession of, and put his troops into proper situations, waiting for the arrival of such reinforcements as were necessary for the intended attack on Charleston.

The profligate conduct of the refugees, and the officers and soldiers of the British, in plundering the houses of individuals, during their incursion, is incredible. Negroes were seduced or forced from their masts; furniture and plate were feized without decency or authority; and the most infamous violations of every law of honour and honesty were openly perpetrated. Individuals thus accumulated wealth, but at the expense of the British arms, which proved impregnable to their attacks. This disappointment was instantly followed by the loss of Port-Royal, which General Prevost took possession of, and put his troops into proper situations, waiting for the arrival of such reinforcements as were necessary for the intended attack on Charleston.

D'Estaing's proclamation.

In the mean time Count D'Estaing, who, as we have already observed, had put into Boston harbour to refit, had used his utmost efforts to ingratiate himself with the inhabitants of that city. Zealous also in the cause of his master, he had published a proclamation to be diffused through Canada, inviting the people to return to their original friendship with France, and declaring that all who renounced their allegiance to Great Britain should certainly find a protector in the king of France. All his endeavours, however, proved insufficient at this time to produce any revolution, or ever to form a party of any consequence among the Canadians.

As soon as the French admiral had refitted his fleet, he took the opportunity, while that of Admiral Byron had been shaken off by a storm, of falling to the West Indies. During his operations there, the Americans having represented his conduct as totally unfeivable to them, he received orders from Europe to assist the colonies with all possible speed.

In compliance with these orders, he directed his course towards Georgia, with a design to recover that province out of the hands of the enemy, and to put it, as well as South Carolina, in such a posture of defence as would effectually secure them from any future attack. This seemed to be an easy matter, from the little force with which he knew he should be opposed; and the next object in contemplation was no less than the destruction of the British fleet and army at New York, and their total expulsion from the continent of America. Full of these hopes, the French commander arrived off the coast of Georgia with a fleet of 22 full of the line and 10 large frigates. His arrival was so little expected, that several vessels laden with provisions and military stores fell into his hands; the experiment also, a vessel of 50 guns, commanded by Sir James Wallace, was taken after a stout resistance. On the continent, the British troops were divided. General Prevost, with an incon siderable part, remained at Savannah; but the main force was under Colonel Maitland at Port Royal. On the first appearance of the French fleet, an express was dispatched to Colonel Maitland: but it was intercepted by the Americans; so that before he could set out in order to join the commander in chief, the Americans had secured most of the passes by land, while the French fleet effectually blocked up the passage by sea. But, by taking advantage of creeks and inlets, and marching over land, he arrived just in time to relieve Savannah.

D'Estaing had allowed General Prevost 24 hours to conduct of deliberate whether he should capitulate or not. This the French time the general employed in making the best preparations he could for a defence; and during this time it was that Colonel Maitland arrived. D'Estaing's famous exploit was now rejected. The garrison now consisted of 3000 men, all of approved valour and experience, while the united force of the French and Americans did not amount to 10,000. The event was anfwerable to the expediencies of the British general. Having the advantage of a strong fortification and excellent engineers, the fire of the allies made so little impression that D'Estaing resolved to bombard the town, and a battery of nine mortars was erected for the purpose. This produced a request from General Prevost, that the women and children might be allowed to remove to a place of safety. But the allied commanders, from motives of policy, refused compliance; and they resolved to give a general assault. This was accordingly attempted on the 9th of October: but the assailants were everywhere repulsed with such slaughter, that 1200 were killed and wounded; among the former were Count Pallas, the celebrated conspirator against the reigning king of Poland, and among the latter was D'Estaing himself.

This disaster entirely overthrew the fanguine hopes of the Americans and French; but so far from reenloothing or animosity arising between them, their common misfortune seemed to increase their confidence and esteem for each other; a circumstance fairly to be ascribed to the conciliatory conduct of General Lincoln upon every occasion. After waiting eight days longer, both parties prepared for a retreat; the French to their shipping, and the Americans into Carolina.

While the allies were thus unsuccessfully employed in the southern colonies, their antagonists were no less affiduous in directing them in the northern parts. Sir George Colliet was sent with a fleet, carrying on board General Matthews, with a body of land forces, into the

Successful expeditions against the northern provinces.
the province of Virginia. Their first attempt was on the town of Portsmouth; where though the Americans had destroyed some ships of great value, the British troops arrived in time to save a great number of others.

On this occasion about 150 vessels of different sizes were burnt, and 20 carried off; and an immense quantity of provisions designed for the use of General Washington's army was either destroyed or carried off, together with a great variety of naval and military stores. The fleet and army returned with little or no loss to New-York.

The succcess with which this expedition was attended, soon gave encouragement to attempt another. The Americans had for some time been employed in the erection of two strong forts on the river; one at Verplanks Neck on the east, and the other at Stoney Point on the west side. These when completed would have been of the utmost service to the Americans, as commanding the principal passage called the King's Ferry, between the northern and southern colonies. At present, however, they were not in a condition to make any effectual defence; and it was therefore determined to attack them before the works should be completed.

The force employed on this occasion was divided into two bodies; one of which directed its course against Verplanks, and the other against Stoney Point. The former was commanded by general Vaughan, the latter by General Patterson, while the sailing was under the direction of Sir George Collier. General Vaughan met with no resistance, the Americans abandoning their works, and setting fire to every thing combustible that they could not carry off. At Stoney Point, however, a vigorous defence was made, though the garrison was at last obliged to capitulate upon honourable conditions.

The possession of this last, which was the more important of the two, General Clinton removed from his former situation, and encamped in such a manner that General Washington could not give any assistance. The Americans, however revengeful themselves by différent expedients with their numerous privateers, the trade to New-York.

This occasioned a third expedition to Connecticut, where these privateers were chiefly built and harboured. The command was given to Governor Tryon and to General Garth, an officer of known valour and experience. Under convoy of a considerable number of armed vessels they landed at Newhaven, where they demolished the batteries that had been erected to oppose them, and destroyed the shipping and naval stores but they spared the town itself, as the inhabitants had abdained from firing out of their houses upon the troops. From Newhaven they marched to Fairfield, where they proceeded as before, reducing the town also to ashes. Norwalk was next attacked, which in like manner was reduced to ashes; as was also Greenfield, a small seaport in the neighbourhood. Such repeated confaginations, wantonly and cruelly spread, served only to incite the diligent which was felt by every friend to the American cause.

These successes proved very alarming as well as detrimental to the Americans; so that General Washington determined at all events to drive the enemy from Stoney Point. For this purpose he sent Gen. Wayne with a detachment of chosen men, directing him to attempt the recovery of it by surprisal. On this occasion the Americans showed a spirit and resolution exceeding any thing either party had performed during the course of the war. Though after the capture of it by the British the fortifications of this place had been completed, and were very strong, they attacked the enemy with bayonets, after failing through a heavy fire of musketry and grape shot; and, in spite of all opposition, obliged the surviving part of the garrison, amounting to 500 men, to surrender themselves prisoners of war.

Though the Americans did not at present attempt to retain possession of Stoney Point, the successes they had met with in the enterprise emboldened them to make a similar attempt on Paulus Hook, a fortified post on the Jersey side, opposite to New-York; but, although the heroism of the interprize and the spirit with which it was executed deserves applause, after having completely surprized the posts, the American commander, Major Lee, finding it impossible to retain them, made an orderly retreat, with about 161 prisoners, among whom were seven officers.

Another expedition of greater importance was now undertaken against the post on the river Penobscot, on the borders of Nova Scotia, of which the British had lately taken possession, and where they had begun to erect a fort which threatened to be a very great inconvenience to the colonists. The armament designed against it was so soon got in readiness, that Colonel Macclay, the commanding officer at Penobscot, found himself obliged to drop the execution of part of his scheme; and instead of a regular fort, to content himself with putting the works already constructed in as good a posture of defence as possible.

The Americans could not effect a landing without a great deal of difficulty, and bringing the guns of their largest vessels to bear upon the shore. As soon as this was done, however, they erected several batteries, and kept up a brisk fire for the space of a fortnight; after which they proposed to give a general assault; but before this could be effected, they perceived Sir George Collier with a British fleet sailing up the river to attack them. On this they instantly embarked their artilleri and military stores, sailing up the river as far as possible in order to avoid them. They were so closely pursued, however, that not a single vessel could escape, so that the whole fleet, consisting of 19 armed vessels and 24 transports, was destroyed; most of them indeed being blown up by themselves. The soldiers and sailors were obliged to wander through immense deserts, where they suffered much for want of provisions; and to add to their calamities, a quarrel broke out between the soldiers and seamen concerning the cause of their disaster, which ended in a violent fray, where a great number were killed.

To add to the distress of the Americans, the Indians, accompanied by a number of refugees, attacked the back settlements of Pennsylvania. No effectual measures being taken to repress the hostile spirit of the Indians, numbers joined the tory refugees, and with these commenced their horrid depredations and hostilities upon the back settlers, being headed by Col. Butler and Brandt, an half blooded Indian, of desperate courage, furious and cruel beyond example. Their expeditions were carried on to great advantage, by the exact knowledge which the refugees possessed of
of every object of their enterprise, and the immediate intelligence they received from their friends on the spot. The weight of their hostilities fell upon the fine, new and flourishing settlement of Wyoming, situated on the eastern branch of the Susquehanna, in a most beautiful country and delightful climate. It was settled and cultivated with great ardor by a number of people from Connecticut, which claimed the territory as included in its original grant from Charles II. The settlement consisted of eight townships, each five miles square, beautifully placed on each side of the river. It had increased so by a rapid population, that they sent a thousand men to serve in the continental army. To provide against the dangers of their remote situation. Four forts were constructed to cover them from the irreptations of the Indians. But it was their unhappiness, to have a considerable mixture of loyalists among them; and the two parties were actuated by sentiments of the most violent animosity which was not confined to particular families or places: but creeping within the roofs and to the hearts and floors where it was least to be expected, forever banished the sources of domestic security and happiness, and to cancel the laws of nature and humanity.

They had frequent and timely warnings of the danger to which they were exposed by sending their best men to go a great distance. Their quiet had been interrupted by the Indians, joined by marauding parties of their own countrymen, in the preceding year; and it was only by a vigorous opposition, in a course of successful skirmishes, that they had been driven off. Several tories, and others not before suspected, had then and since abandoned the settlement; and besides a perfect knowledge of all their particular circumstances, carried along with them such a stock of private resentment, as could not fail of directing the fury, and even giving an edge to the cruelty of their Indian and other inveterate enemies. An unusual number of strangers had come among them under various pretences, whose behaviour became so sanguine, that upon being taken up and examined, such evidence appeared against several of them, of their acting in concert with the enemy, on a scheme for the destruction of the settlements, that about twenty were sent off to Connecticut to be there imprisoned and tried for their lives, while the remainder were expelled. These measures excited the rage of the tories in general to the most extreme degree; and the threats formerly denounced against the settlers, were now renewed with aggravated vengeance.

As the time approached for the final catastrophe, the Indians practiced unusual treachery. For several weeks previous to the intended attack, they repeatedly sent small parties to the settlement, charged with the strongest professions of friendship. These parties, beseeching attempts to lull the people into security, answered the purposes of communicating with their friends, and of observing the present state of affairs. The settlers, however, were not infensible to the danger. They had taken the alarm, and Col. Zebulon Butler had several times written letters to congress and gen. Washington, acquainting them with the danger the settlement was in, and requesting assistance; but the letters were never received, having been intercepted by the Pennsylvania tories. A little before the main attack, some small parties made sudden irruptions, and committed several robberies and murders; and from ignorance or a contempt of all ties whatever, massacred the wife and five children of one of the persons sent for trial to Connecticut in their own cause.

At length, in the beginning of July, the enemy suddenly appeared in full force on the Susquehanna, headed by Col. John Butler, a Connecticut Tory, and cousin to Col. Zeb. Butler, the second in command in the settlement. He was assisted by most of the leaders, who had rendered themselves terrible in the present frontier war. Their force was about 1600 men, near a fourth Indians, led by their own chiefs; the others were so disguised and painted as not to be distinguished from the Indians, excepting their officers, who being dressed in regiments, carried the appearance of regulars. One of the smaller forts, garrisoned chiefly by tories, was given up or rather betrayed. Another was taken by storm, and all but the women and children massacred in the most inhuman manner.

Col. Zeb. Butler, leaving a small number to guard fort Wilkesborough, crossed the river with about 400 men, and marched into Kingston fort, whither the women, children and defenseless of all forts crowded for protection. He suffered himself to be enticed by his cousin to abandon the forts. He agreed to march out, and hold a conference with the enemy in the open field (at so great a distance from the fort, as to shut out all possibility of protection from it) upon their withdrawing according to their own proposal, in order to the holding of a parley for the conclusion of a treaty. He at the same time marched out about 400 men well armed, being nearly the whole strength of the garrison, to guard his persons to the place of parley, such was his distrust of the enemy's designs. On his arrival he found no body to treat with him, and yet advanced toward the foot of the mountain, where at a distance he saw a flag, the holders of which, seemingly afraid of treachery on his side, retired as he advanced: whilst he, endeavoring to remove this pretended ill-impression, purified the flag, till his party was thoroughly enclosed, when he was suddenly freed from his delusion, by finding it attacked at once on every side. He and his men, notwithstanding the surpise and danger, fought with resolution and bravery, and kept up so continual and heavy a fire for three quarters of an hour, that they seemed to gain a marked superiority. In this critical moment, a soldier, through a sudden impulse of fear or premeditated treachery, cried out aloud, "the colonel has ordered a retreat." The fate of the party was now at once determined. In the state of confusion that ensued, an unresisted slaughter commenced, while the enemy broke in on all sides without obstruction. Col. Zeb. Butler, and about seventy of his men escaped; the latter got across the river to fort Wilkesborough, the colonel made his way to fort Kingston; which was invested the next day on the land side. Fort Kingston was invested the next day on the land side. Fort Kingston was invested the next day on the land side. Fort Kingst...
Spain made them fcrupulous of fire, they enjoyed the favage pleasure of beholdings the whole continued in one general blaze.

They then croffed the river to the only remaining fort, Wilkesborough, which in hopes of mercy for- rendered without demanding any conditions. They found about forty continental soldiers, who had been engaged merely for the defence of the frontier, whom they butchered with every circumstance of horrid cruelty. The remainder of the men, with the women and children, were shut up as before in the houfes, which being fet on fire, they perifhed altogether in the flames.

A general fcnce of devastation was now spread through all the towns. Fire, fword, and the other different instruments of deftitution alternately triumphed. The fettlements of the towns alone generally escaped, and appeared as islands in the midft of the surrounding ruin. The mercenaries having destroyed the main objets of their cruelty, directed their animofity to every part of living nature belonging to them; Shot and destroyed none of their cattle, and cut out the tongues of others, leaving them still alive to prolong their agonies.

Thus the arms of America and France being atmoft every where unfruitful, the independence of the former fanned yet to be in danger, notwithstanding the affiftance of fo powerful an ally, when further encouragement was given by the aecceffion of Spain to the confederacy againft Britain in the month of June 1779. The firft effect of this appeared in an invasion of West Florida by the Spaniards in September 1779. As the country was in no fate of defence, the enemy easily made themselves masters of the whole, withoat much opposition. Their next enterprife, was againft the Bay of Honduras, where the British logwood-cutter were fettled. These finding themselves too weak to reft, applied to the governor of Jamaica for relief, who fent them a supply of men, ammunition, and military stores, under Captain Dalrymple. Before the arrival of this detachment, the principal fettlement in that parts, called St George’s Key, had been taken by the Spaniards and retaken by the Britifh. In his way Captain Dalrymple fell in with a squadron from Admiral Parker in fearch of fome refifter ships richly laden; but which, retreatting into the harbour of Omoa, were too flrongly proceeded by the fort to be attacked with safety. A project was then formed, in conjunction with the people of Honduras, to reduce this fort.

The design was to surprife it; but the Spaniards having discovered them, they were too well prepared for the Britifh; but the for- tifications were fo strong, that the artillery they had brought along with them were found too light to make any impression. It was then determined to try the fuccefs of an encalade, and this was executed with fo much spirit, that the Spaniards ftood affonnified without making any refiftance, and, in fpite of all the ef- forts of the officers, threw down their arms and for- rendered. The fpoil was immense, being valued at three millions of dollars. The Spaniards chiefly la- mented the los of 250 quintals of quickfiver; a com- modity indifpenfably neceffary in the working of their gold and silver mines, fo that they offered to ranfom it for any price; but this was refused, as well as the ranfom of the fort, though the governor offered 300,000 dollars for it. A small garrison was left for but are the defence of the place; but it was quickly attacked obliged by a fuperior force, and obliged to evacuates it, though not without destroying every thing that could be of ufe to the enemy; fpiking the guns, and even locking the gates of the fort and carrying off the keys. All this was done in fight of the beholders; after which the garrison embarked without the los of a man.

As no operations of any confequence took place this year in the province of New-York, the congrafs made use of the opportunity to difpatch General Sullivan with a confiderable force, in order to take vengeance on the Indians for their ravages and depredations. Of this the Indians were apprife; and collecting all their flrength, refolved to come to a decisive engage- ment. Accordingly they took a ftrong poft in the moft woody and mountainous part of the country; erecting a breast-work in their front, of large logs of wood extending half a mile in length, while their right flank was covered by a river, and the left by a hill of difficult access. This advantageous pofition they had taken by the advice of the refugees who were among them, and of whom 200 or 300 were prefent in the battle.

Thus pofted, the Indians waited the approach of the American army; but the latter having brought some artillery along with them, played it againſt the breast-work of the enemy with fuch fuccefs, that in two hours it was almost destroyed; and at the fame time a party having reached the top of the hill, they became apprehensive of being furredoned, on which they infantly fled with precipitation, leaving a great number of killed and wounded behind them. The Americans after this battle met with no further reffiance of any confequence. They were fuffered to proce without interruption. On entering the country of the Indians, it appeared that they had been acquainted with agriculture and the arts of peace far be- yond what had been fuppofed. From General Sulli- van’s account it was learned, that the Indian houfes were large, convenient, and even elegant; their grounds were excellently cultivated, and their gardens abounded in fruit-trees and vegetables of all kinds fit for food. The whole of this fine country would now have been converted into a defart, had it not been for the humane forbearance of General Hand
and Colonel Durbin. The devastation, however, was extensive, and only to be justified by the savage character and example of their enemy.

We must now take a view of the transactions in the southern colonies; to which the war was, in the year 1779, principally transferred, that the reader may form some idea of the disasters which occurred there before it came to a last decisive. The successes of General Prevost in advancing to the very capital of South-Carolina have already been related, together with the obstacles which prevented him from becoming master of it at that time. Towards the end of the year 1779, however, Sir Henry Clinton set sail from New-York with a considerable body of troops, intended for the attack of Charleston, South-Carolina, in a fleet of ships of war and transports under the command of Vice-admiral Arbuthnot. They had a very tedious voyage; the weather was uncommonly bad; several of the transports were lost, as were also the greater part of the horses which they carried with them, intended for cavalry or other public uses; and an ordnance-ship likewise foundered at sea. Having arrived at Savannah, where they endeavoured to repair the damages sustained on their voyage, they proceeded from thence on the 10th of February, 1780, to North Edisto, the place of debarkation which had been previously appointed. They had a favourable and speedy passage thither; and though it required time to have the bar explored and the channel marked, the transports all entered the harbour the next day; and the army took possession of St. John’s Island, about 30 miles from Charleston, without opposition. Preparations were then made for paffing the squadron over Charleston bar, where the high-water spring-tides were only 19 feet deep: but no opportunity offered of going into the harbour till the 20th of March, when it was effected without any accident, though the American galleys continually attempted to prevent the English boats from founding the channel. The British troops had previously removed from John’s to James’s Island, and on the 29th of the same month they effected operations on Charleston neck. On the 14th of April they broke ground within 800 yards of the American works; and by the 9th the besiegers guns were mounted in battery. As soon as the army began to erect their batteries against the town, Admiral Arbuthnot embraced the first favourable opportunity of paffing Sullivan’s Island, upon which there was a strong fort of batteries, the chief defence of the harbour. He weighed on the 9th, with the Roebuck, Richmond, and Romulus, Blonde, Virginia, Raleigh, and Sandwich armed ships, the Renown bringing up the rear; and, paffing thro’ a severe fire, anchored in about two hours under James’s Island, with the loss of 27 seamen killed and wounded. The Rich mond’s fore-top-mast was shot away, and the ships in general sustained damage in their masts and rigging, though not materially in their hulls. But the Acesus transported, having on board some naval stores, grounded within gun-shot of Sullivan’s Island, and received so much damage that she was obliged to be abandoned and burnt.

On the 10th, Sir Henry Clinton (having received a reinforcement of 5000 men from New York) and Admiral Arbuthnot summoned the town to surrender to his majesty’s arms: but Major-general Lincoln, who commanded in Charleston, returned them an answer, declaring it to be his intention to defend the place. The batteries were now opened against the town; and from their effect the fire of the American advanced works considerably abated. It appears that the number of troops under the command of Lincoln were by far too few for defending works of such extent as those of Charleston; and that many of these were men little accustomed to military service, and very ill provided with clothes and other necessaries. Lincoln had been for some time expecting reinforcements and supplies from Virginia and other places: but they came in very slowly. Earl Cornwallis, and Lieutenant-colonel Tarleton under him, were also extremely active in intercepting such reinforcements and supplies as were sent to the American general. They totally defeated a considerable body of cavalry and militia which was proceeding to the relief of the town; and also made themselves masters of some posts which gave them in a great degree the command of the country, by which means great supplies of provisions fell into their hands. Tarleton was himself, however, defeated in a rencontre, with Lieutenant Colonel Washington, at the head of a regular corps of horse.

Such was the state of things, and Fort Sullivan had also been taken by the king’s troops, when on the 18th of May General Clinton again summoned the town to surrender; an offer being made, as had been done before, that if they surrendered, the lives and property of the inhabitants should be preferred to them. Articles of capitulation were then proposed by General Lincoln; but the terms were not agreed to by General Clinton. At length, however, the town being closely invested on all sides, and the preparations to storm it in every part being in great forwardness, and the ships ready to move to the assault, General Lin­coln, who had been applied to for that purpose by the inhabitants, surrendered it on such articles of capitulation as General Clinton had before agreed to. This was on the 4th of May, which was one month and two days after the town had been first summoned to surrender.

A large quantity of ordnance, arms, and ammunition, was found in Charleston; and, according to Sir Henry Clinton’s account, the number of prisoners taken in Charleston amounted to 5618 men, exclusive of near a thousand failors in arms; but according to General Lincoln’s account transmitted to the congress, the whole number of continental troops taken prisoners amounted to no more than 197. The remainder, therefore, included in General Clinton’s account, consisted of militia and inhabitants of the town. Several American frigates were also taken or destroyed in the harbour of Charleston.

The loss of Charleston evident itself excited a considerable alarm in America; and their popular writers, particularly the author of the celebrated performance entitled Common Sense, in some other pieces made use of it as a powerful argument to lead them to more vigorous exertions against Great Britain; that they might the more effectually and certainly secure their independence.

While Sir Henry Clinton was employed in his voy­age to Charleston, and in the siege of that place fions at the New York.
The garrison at New-York seem not to have been wholly free from apprehensions for their own safety. An intense frost, accompanied with great falls of snow, began about the middle of December 1779, and shut up the navigation of the port of New-York from the sea, within a few days after the departure of Admiral Arbuthnot and General Clinton. The severity of the weather increased to so great a degree, that towards the middle of January all communications with New-York by water were entirely cut off, and as many new ones opened by the ice. The inhabitants could fearfully be said to be in an inurable state. Horses with heavy carriages could go over the ice into the Jersey from one island to another. The passage on the North River, even in the widest part from New-York to Paulus Hook, which was 2000 yards, was about the 19th of January practicable for the heaviest cannon; an event which had been unknown in the memory of man. Provisions were soon after transported upon sledges, and a detachment of cavalry marched upon the ice from New-York to Staten Island, which was a distance of 11 miles.

The city of New-York being thus circumstanced, was considered as much exposed to the attacks from the continental troops: and it was strongly reported that General Washington was meditating a great stroke upon New-York with his whole force, by different attacks. Some time before this, Major-general Paullson, commandant at New-York, having received an address from many of the inhabitants, offering to put themselves in military array, he thought the present a favourable opportunity of trying the sincerity of their professions. Accordingly he issued a proclamation, calling upon all the male inhabitants from 16 to 60 to take up arms. The requisition was so readily complied with, that in a few days 40 companies from the fix wards of the city were enrolled, officered, and under arms, to the number of 2500, many substantial citizens serving in the ranks of each company. Other volunteer companies were formed, and the city was put into a very strong posture of defence.

No attack, however, was made upon New-York, whatever design might originally have been meditated; but an attempt was made upon Staten Island, where there were about 1800 men, under the command of Brigadier-general Sterling, who were well intrenched. General Washington, whose army was halted at Morris-Town, sent a detachment of 2700 men, with six pieces of cannon, two mortars, and some horses, commanded by Lord Sterling, who arrived at Staten Island early in the morning of the 15th of January. The advanced posts of the British troops retired upon the approach of the Americans, who formed the line, and made some movements in the course of the day; but they withdrew in the night after having burnt one house, pillaged some others, and carried off with them about 200 head of cattle.

Immediately on the arrival of the Americans on Staten Island, Lieutenat-general Knox had embarked 600 men to attempt a passage, and to support General Sterling; but the floating ice compelled them to return. It is, however, imagined, that the appearance of these transports, with the British troops on board, which the Americans could see towards the close of the day, induced the latter to make so precipitate a retreat.

After Charleston had surrendered to the King's troops, General Clinton issued two proclamations, and also circulated a hand-bill among the inhabitants of South-Carolina, in order to induce them to return to their allegiance, and to be ready to join the King's troops. It was said, that the helping hand of every man was wanted to re-establish peace and governement; and that as the commander in chief wished not to draw the kings friends into danger, while any doubt could remain of their success; fo, now, that this was certain, he trusted that one and all would heartily join, and by a general concurrence give effect to such necessary measures for that purpose as from time to time might be pointed out. Those who had families were to form a militia to remain at home, and occasionally to assemble in their own districts, when required, under officers of their own choosing, for the maintenance of peace and order. Those who had no families, and who could conveniently be spared for a time, it was presumed, would cheerfully assist his majesty's troops in driving their oppressors, acting under the authority of Congress, and all the miseries of war, far from that colony. For this purpose it was said to be necessary that the young men should be ready to serve whenever required, and to serve with the king's troops for any six months of the ensuing twelve that might be found requisite, under proper regulations. They might choose officers to each company to command them; and were to be allowed, when on service, pay, ammunition, and provisions, in the same manner as the king's troops. When they joined the army, each man was furnished with a certificate, declaring that he was only engaged to serve as a militia-man for the time specified; that he was not to be marched beyond North-Carolina and Georgia; and that, when the time was out, he was freed from all claims whatsoever of military service, excepting the common and usual militia-duty where he lived. He would then, it was said, have paid his debt to his country, and be intitled to enjoy undisturbed that peace, liberty, and property, at home, which he had contributed to secure. The proclamations and publications of General Clinton appear to have produced some effect in South Carolina; though they probably operated chiefly upon those who were before not much inclined to the cause of American independence. Two hundred and ten of the inhabitants of Charleston signed an address to General Clinton and Admiral Arbuthnot, soliciting to be readmitted to the character and condition of British subjects, the inhabitants of that city having been hitherto considered as prisoners on parole; declaring their disapprobation of the doctrine of American independence; and expressing their regret, that after the repeal of those statutes which gave rise to the troubles in America, the overtures made by his majesty's commissioners had not been regarded by the Congress. Sir Henry Clinton, in one of the proclamations issued at this time, declared, that if any persons should henceforward appear in arms in order to prevent the establishment of his majesty's government in that country, or should, under any pretence or authority whatsoever, attempt to compel any other per-
Some doubts having arisen in the congress, towards the close of the preceding year, about the propriety of their assembling in the city of Philadelphia, it was now resolved that they should continue to meet there: and a committee of three members was appointed, to report a proper place where buildings might be provided for the reception of the congress, together with an estimate of the expense of providing such buildings, and the necessary offices for the several boards. It was also resolved by the congress, that a monument should be erected to the memory of their late general Richard Montgomery, who fell at Quebec, in testimony of his signal and important services to the United States of America, with an inscription expressive of his amiable character and heroic achievements; and that the continental treasurers should be directed to advance a sum not exceeding L.300 to Dr Franklin to defray the expense; that gentleman being desired to cause the monument to be executed at Paris, or in some other part of France. It was likewise resolved by the congress, that a court should be established for the trial of all appeals from the court of admiralty of the United States of America, in cases of capture; to consist of three judges, appointed and commissioned by congress, and who were to take an oath of office; and that the trials in this court should be determined by the usage of nations.

The difficulties of the congress and of the people of America had been greatly increased by the depreciation of their paper currency. At the time when the colonies engaged in a war with Great Britain, they had no regular civil governments established among them of sufficient energy to enforce the collection of taxes, or to provide funds for the redemption of such bills of credit as their necessities obliged them to issue. In consequence of this state of things, their bills increased in quantity far beyond the sum necessary for the purpose of a circulating medium: and as they wanted at the same time of specific funds to rest upon for their redemption, they saw their paper-currency daily sink in value. The depreciation continued, by a kind of gradual progression, from the year 1777 to 1780: so that, at the latter period, the continental dollars were passed, by common consent, in most parts of America, at the rate of at least theirs below their nominal value. The imposibility of keeping up the credit of the currency to any fixed standard, occasioned great and almost insurmountable embarrassments in ascertaining the value of property, or carrying on trade with any sufficient certainty. Those who sold, and those who bought, were left without a rule wherein to form a judgment of their profit or their loss; and every species of commerce or exchange, whether foreign or domestic, was exposed to numberless and increasing difficulties. The consequences of the depreciation of the paper-currency were also felt with peculiar severity by such of the Americans as were engaged in their military services, and greatly augmented the other hardships. The requisitions made by the congress to the several colonies for supplies, were also far from being always regularly complied with; and their troops were not frequently in want of the most common necessaries; which naturally occasioned complaints and discontent among them. Such difficulties, resulted from their circumstances and situation, as perhaps no wisdom could have prevented. The cause of the Americans appears also to have suffered somewhat by their depending too much on temporary enlistments. But the congress endeavoured, towards the close of the year 1780, to put their army upon a more permanent footing, and to give all the satisfaction to their officers and soldiers which their circumstances would permit. They appointed a committee for arranging their finances, and made some new regulations respecting the war-office and treasury-board, and other public departments.

Notwithstanding the disadvantages under which they laboured, the Americans seemed to entertain no doubts but that they should be able to maintain their independence. The 4th of July was celebrated this year at Philadelphia with some pomp, as the anniversary of American independence. A commencement for conferring degrees in the arts was held the same day, in the hall of the university there; at which the president and members of the congress attended, and other persons in public offices. The Chevalier de la Luzerne, minister plenipotentiary from the French king to the United States, was also present on the occasion. A charge was publicly addressed by the provost of the university to the students; in which he said, that he could not but congratulate them on that auspicious day, which, according to the confessions and declarations of war, behold learning beginning to revive; and animated them with the pleasing prospect of seeing the sacred lamp of science burning with a still brighter flame, and scattering its invigorating rays over the unexplored declivities of this extensive continent; until the whole world should be involved in the united blaze of knowledge, liberty, and religion. When he stretched his views forward (he said), and surveyed the rising glories of America, the enriching consequences of their determined struggle for liberty, the extensive fields of intellectual improvement and useful inventions, in science and arts, in religion and government, through which the unsteady mind would range, with increasing delight, in quest of the undiscovered treasure which yet lay concealed in the animal, vegetable, and mineral kingdoms of the new world; or in the other fertile sources of knowledge with which it abounded,—his heart swelled with the pleasing prospect, that the sons of that initiation would distinguish themselves, in the different walks of life, by their literary contributions to the embellishments and increase of human happiness."

On the 10th of July, M. Ternay, with a fleet consisting...
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A large body of French troops landed at Rhode Island. A committing of seven ships of the line, besides frigates, and a large body of French troops, commanded by the Count de Rochambeau, arrived at Rhode Island, and the following day 6000 men were landed there. A committee from the general assembly of Rhode Island was appointed to converse with the French general upon his arrival: whereupon he returned an answer, in which he informed them, that the king his master had sent him to the assistance of his good and faithful allies the United States of America. At present, he said, he only brought over a number of greater force defined for their aid; and the king had ordered him to affure them, that his whole power should be exerted for their support. He added, that the French troops were under the strictest discipline; and, acting under the orders of General Washington, would live with the Americans as their brethren.

A scheme was soon after formed, of making a combined attack with English ships and troops, under the command of Sir Henry Clinton and Admiral Arbuthnot, against the French fleet and troops at Rhode Island. Accordingly a considerable part of the troops at New-York were embarked for that purpose. General Washington having received information of this, passed the North River, by a very rapid movement, and, with an army increased to 12,000 men, proceeded with celerity towards King's Bridge, in order to attack New-York; but learning that the British general had changed his intentions, and disembarked his troops on the 3d of the month, General Washington recrossed the river and returned to his former station. Sir Henry Clinton and the Admiral had agreed to relinquish their design of attacking the French and Americans at Rhode-Island as impracticable for the present.

An unsuccessful attempt was also made about this time in the Jerseys by General Knoxhausen, with about 7000 British troops under his command, to surprize the advanced posts of General Washington's army. They proceeded very rapidly towards Springfield, meeting little opposition till they came to the bridge there, which was very gallantly defended by 170 of the continental troops, for 15 minutes, against the British army; but they were at length obliged to give up this unequal contest, with the loss of 37 men. After securing this pafs, the British troops marched into the place, and set fire to most of the houses. They also committed some other depredations in the Jerseys; but gained no laurels there, being obliged to return about the beginning of July without effecting any thing material.

But in South-Carolina the royal arms were attended with more success. Earl Cornwallis, who commanded the British troops there, obtained a signal victory over General Gates on the 16th of August. The Action began at break of day, in a situation very advantageous for the British troops, but very unfavourable to the Americans. The latter were much more numerous; but the ground on which both armies was flooded was narrowing to the small river. The attack was made by the British troops with great vigour, and in a few minutes the action was general along the whole line. It was at this time a dead calm with a little haziness in the air, which prevented the smoke from rising, occasioned so thick a darkness, that it was difficult to see the effects of a very heavy and well supported fire on both sides. The British troops either kept up a continuous fire, or desisted, as opportunities offered; and after an obstinate resistance during three quarters of an hour, threw the Americans into total confusion, and forced them to give way in all quarters. The continental troops behaved remarkably well, but the militia were soon broken, and left the former to oppose the whole force of the British troops. General Gates did all in his power to rally the militia, but without effect; the continental retreated in some order, but the rout of the militia was so great, that the British cavalry are said to have continued the pursuit of them to the distance of 22 miles from the place where the action happened. The losses of the Americans was very considerable; about 1000 prisoners were taken, and more are said to have been killed and wounded, but the number is not very accurately ascertained. Seven pieces of brass cannon, a number of colours, and all the ammunition-waggons of the Americans, were also taken. Of the British troops, the killed and wounded amounted to 213.

Among the prisoners taken was Major-general Baron de Kalb, a Prussian officer in the American service, who was mortally wounded, having exhibited great gallantry in the course of the action, and received 11 wounds. The British troops by which this victory was achieved, did not much exceed 2000, while the American army is said to have amounted to 6000; of which, however, the greatest part was militia.

Lieutenant-colonel Tarleton, who had greatly distinguished himself in this action, was detached the Lieut. Co. following day, with some cavalry and light infantry, amounting to about 350 men, to attack a corps of Americans under General Sumpter. He executed this service with great activity and military address. He procured good information of Sumpter's movements; and by force and concealed marches came up with and surprised him in the middle of the day on the 18th, near the Catawba fords. He totally destroyed or dispersed his detachment, which consisted of 700 men, killing 150 on the spot, and taking two pieces of brass cannon, 300 prisoners, and 44 waggons.

Not long after these events, means were found to detach Major-general Arnold, who had engaged for a considerable time in the cause of America, and who had exhibited much bravery in the support of it, from the interests of the congress. Major Andre, adjutant-general to the British army, was a principal agent in this transaction: or, if the overtaking of joining the king's troops came first from Arnold, this gentleman was the person employed to concert the affair with him. More must have been originally comprehended in the scheme than the mere deportation of the American cause by Arnold: The surrender of West-Point into the hands of the royal army, was the probable object; but whatever designs had been formed for promoting the views of the British government, they were frustrated by the apprehending of Major Andre. He was taken in disguise, after having assumed a false name, on the 23d of September, by three American soldiers, to whom he offered considerable rewards if they would have suffered him to escape, but without effect. Several papers written by Arnold were found upon him; and when Arnold had learnt that Major Andre was seized,
feized, he found means to get on board a barge, and to escape to one of the king's ships. General Washington referred the case of Major Andre to the examination and decision of a board of general officers, consisting of Major-general Green, Major-general Lord Sterling, Major-general the Marquis de la Fayette, Major-general the Baron de Steuben, two other major-generals, and eight brigadier-generals. Major Andre was examined before them, and the particulars of his case inquired into; and they reported to the American commander in chief, that Mr. Andre came on shore from the Vulture sloop of war in the night, on an interview with General Arnold, in a private and secret manner; that he changed his drefs within the American lines; and, under a feigned name, and in a disguised habit, passed the American works at Stony and Verplank's points, on the evening of the 22d of September; that he was taken on the morning of the 23d at Tarry-town, he being then on his way for New York: and that, when taken, he had in his possession several papers which contained intelligence for the enemy. They therefore determined, that he ought to be considered as a spy from the enemy; and that, according to the law and usage of nations, he ought to suffer death. Sir Henry Clinton, Lieutenant-general Robertson, and the late American general Arnold, all wrote pressing letters to General Washington on the occasion, in order to prevent the decision of the board of general officers from being put in force: But their applications were ineffectual. Major Andre was hanged at Tappan, in the province of New-York, on the 2d of October. He met his fate with great firmness; but appeared somewhat hurt that he was not allowed a more military death, for which he had solicited. He was a gentleman of very amiable qualities, had a taste for literature and the fine arts, and possessed many accomplishments. His death, therefore, was regretted even by his enemies; and the seeming severity of the determination concerning him was much exclaimed against in Great Britain. It was, however, generally acknowledged by impartial persons, that there was nothing in the execution of this unfortunate gentleman but what was perfectly consonant to the rules of war.

Arnold was made a brigadier-general in the king's service, and published an address to the inhabitants of America, dated from New-York, October 7, in which he endeavoured to justify his desertion of his cause. He said, that when he first engaged in it, he conceived the rights of his country to be in danger, and that duty and honour called him to his defence. A redress of grievances was his only aim and object; and therefore he acquiesced unwillingly in the declaration of independence, because he thought it precipitate. But what now induced him to desert their cause was the dishonour he had conceived at the French alliance, and at the refusal of Congress to comply with the last terms offered by Great Britain, which he thought equal to all their expectations and all to their wishes.

The Americans, however, accounted for the conduct of Arnold in a different and in a more probable and satisfactory manner. They alleged that he had so involved himself in debts and difficulties by his extravagant manner of living in America, that he had rendered it very inconvenient for him to continue there; that after the evacuation of Philadelphia by the British troops, Arnold, being invested with the command in that city, had made the house of Mr. Penn, which was the belt in the city, his head-quarters. This he had furnished in an elegant and expensive manner, and lived in a style far beyond his income. It was manifest, they said, that he could at first have no great aversion to the French alliance, because that when M. Gerard, minister plenipotentiary from the court of France, arrived at Philadelphia in July 1778, General Arnold early and earnestly solicited that minister, with his whole fortune, to take apartments and bed and board at his house, until a proper house could be provided by the order of the congress. This offer M. Gerard accepted, and continued with him some weeks. The French minister resided upwards of 14 months in Philadelphia; during which time General Arnold kept up the most friendly and intimate acquaintance with him, and their was a continued interchange of dinners, balls, routes, and concerts; so that M. Gerard must have believed, that in General Arnold he had found and left one of the warmest friends the court of France had in America. He was also one of the first in congratulating the Chevalier de la Luzerne, the second French minister. About this time complaints and accusations were exhibited against him by the government of Philadelphia for divers mal-practices; among which charges were, the appropriation of goods and merchandise to his own use, which he had feized as British property in Philadelphia in July 1778. It was determined by a court-martial that his conduct was highly reprehensible; but he was indulgently treated, and was therefore only reprimanded by the commander in chief General Washington. It was in these circumstances, the Americans said, bankrupted in reputation and fortune, loaded with debts, and having a growing and expensive family, that General Arnold first turned his thoughts towards joining the royal arms.

After the defeat of General Gates by Earl Cornwallis, that nobleman exerted himself to the utmost in South-Carolina extending the progress of the British arms, and with considerable effect. But one enterprise, which was conducted by Major Ferguson, proved unsuccessful. That officer had taken abundant pains to discipline some of the Tory militia, as they were termed; and with a party of these, and some British troops, amounting in the whole to about 1400 men, made incursions into the country. But on the 7th of October he was attacked by a superior body of Americans, at a place called King's mountain, and totally defeated. One hundred and fifty were killed in the action, and 810 made prisoners, of which 150 were wounded. Fifteen hundred stands of arms also fell into the hands of the Americans, whose loss was inconsiderable. But the following month Lieutenant-Colonel Stiles, with a party of 170, chiefly cavalry, attacked General Sampson, who is said to have had 1000 men, at a place called Black-Stocks, and obliged him to retire. Sampson was wounded, and about 120 of the Americans killed, wounded, or taken. Of the British troops about 50 were killed or wounded.

On the 3d of September, the Mercury, a congress Capture of packet, was taken by the Vessal, Captain Keppel, near Mr. Lau-

Newfoundland. On board this packet was Mr. Lau-

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America.

Unhappy fate of Major Andre.

His amiable qualities.

Motives assigned by Arnold for his conduct.
At the beginning of the year 1781, an affair happened in America, from which expectations were formed by Sir Henry Clinton, that some considerable advance might be derived to the royal cause. The long continuance of the war, and the difficulties under which the congress laboured, had prevented their troops from being properly supplied with necessaries and conveniences. In consequence of this, on the first of January, the American troops that were hitted at Morris-town, and who formed what was called the Pennsylvania line, turned out, being in number 1,500, and declared, that they would serve no longer, unless their grievances were redressed, as they had not received their pay or been furnished with the necessary clothing or provisions. It is said that they were somewhat inflamed with liquor, in consequence of rum having been distributed to them more liberally than usual, the preceding day being considered as a kind of festival. A riot ensued, in which an officer was killed, and four wounded; five or six of the insurgents were also wounded. They then collected the artillery, stores, provisions, and wagons, and marched out of the camp. They pulled by the quarters of General Wayne, who sent a message to them, requesting them to desist, or the consequences would prove fatal. They refused, and proceeded on their march till the evening, when they took post on an advantageous piece of ground, and elected officers from among themselves. On the second day they marched to Middlebrook, and on the third to Princeton, where they fixed their quarters. On that day a flag of truce was sent to them from the officers of the American camp, with a message, desiring to know what were their intentions. Some of them answered, that they had already served longer than the time for which they were enlisted, and would serve no longer; and others, that they would not return, unless their grievances were redressed. But at the same time they repeatedly, and in the strongest terms, denied being influenced by the least dissatisfaction to the American cause, or having any intentions of defecting to the enemy.

Intelligence of this transactin was soon conveyed to New-York. A large body of British troops were immediately ordered to hold themselves in readiness to move on the shortest notice, it being hoped that the American provincials might be induced to join the royal army. Messengers were also sent to them from General Clinton, acquainting them that they should directly be taken under the protection of the British government; that they should have a free pardon for all former offences; and that the pay due to them from the congress should be faithfully paid them without any expectation of military service, unless it should be voluntary, upon condition of their laying down their arms, and returning to their allegiance. It was also recommended to them to move beyond the South River; and when they were assured, that a body of British troops should be ready to protect them whenever they defined it. These propositions were rejected with disdain; and they even delivered up two of Sir Henry Clinton's messengers to the congress. Joseph Reid, Esq; president of the state of Pennsylvania, afterwards repaired to them at Princeton, and an accommodation took place: such of them as had served out their full terms were permitted to return to their own homes, and others again joined the American army, upon receiving satisfactory assurances that their grievances should be redressed.

On the 11th of January Lord Cornwallis advanced Exactions towards North Carolina. He wished to drive Gen. Lord Morgan from his station, and to deter the inhabitants from joining him. The execution of this business was intrusted to Lieut. Col. Tarleton; who was detached with the light and legion infantry, the furlers, the first battalion of the 71st regiment, about 390 cavalry, two field pieces, and an adequate proportion of men from the royal artillery, numbered of 1,500 in the whole. This detachment, after a progress of some days, by fatiguing marches, at about ten o'clock on the evening of the 16th of January, reached the ground on which Morgan had quitted, but a few hours before. The pursuit recommenced by two o'clock the next morning, and was rapidly continued through marshes and broken grounds till day light, when the Americans were discovered in front. Two of their videttes were taken soon after, who gave information that Morgan had halted and prepared for action, at a place called the Cowpen, near Pacolet river. The British, beside their field pieces, had the superiority in infantry, in the proportion of five to four, and in cavalry of more than three to one. Beside, nearly two thirds of the troops under Morgan were militia. Morgan had obtained early intelligence of Tarleton's force and advances; and had drawn up his men in two lines. The whole of the North and South Carolina militia present was put under the command of Col. Pickens, and formed the first line; which was advanced a few hundred yards before the second, with orders to form on the right of the second when forced to retire. The second line consisted of the light infantry under Lieut. Col. Howard, and the Virginia riflemen. Lieut. Col. Washington, with his cavalry, and about forty-five militia men, mounted and equipped with swords, under Lieut. Col. M'Call, were drawn up at some distance in the rear of the whole. The open woods in which they were formed, was neither secured in front, flank or rear. Without the delay of a single moment, and in spite of extreme fatigue, the light legion infantry and furlers were ordered to form in line. Before the order was executed, and while Major Newmarth, who commanded the latter corps, was posting his officers, the line, though far from complete, was led to the attack by Tarleton himself. The British advanced with a howl, and poured in an incessant fire of musketry. Col. Pickens directed the militia not to fire till the British were within forty or fifty yards. This order, though executed with great firmness and success, was not sufficiently
sufficient to repel the enemy. The American militia gave way on all quarters. The British advanced rapidly, and engaged the second line. The Continentals, after an obstinate conflict, were compelled to retreat to the cavalry. Col. Ogilive, with his troop of forty men, had been ordered to charge the right flank of the Americans, and was engaged in cutting down the militia; but being exposed to a heavy fire, and charged at the same time by Washington's dragoons, was forced to retreat in confusion. A great number of the British infantry officers had already fallen, and nearly a proportionable number of privates. The remainder being too few and too much fatigued, could not improve the advantage gained over the Continentals; and Tarleton's Legion cavalry standing aloof instead of advancing, Lieut. Col. Howard seized the favourable opportunity, rallied the Continentals, and charged with fixed bayonets, nearly at the same moment when Washington made his successful attack. The example was instantly followed by the militia. Nothing could exceed the abandonment of Tarleton's Legion occasioned by their unexpected charges. Their advance fell back, and communicated panic to others, which soon became general. Two hundred and fifty horses which had not been engaged, fled through the woods with the utmost precipitation, bearing down such officers as opposed their flight; and the cannon were soon feized by the Americans, the detachment from the train either killed or wounded in their defence. The greatest confusion now followed among the infantry. In the moment of it Lieut. Col. Howard called to them to lay down their arms, and promised them good quarters. Some hundreds accepted the offer, and surrendered. The first battalion of the 71st regiment, and two British light infantry companies laid down their arms to the American militia. The only body of infantry that escaped, was a detachment left at some distance to guard the baggage. Early intelligence of their defeat was conveyed to the officer commanding that corps by some loyalists. What part of the baggage could not be carried off immediately destroyed; and with his men mounted on the waggon and spare horses, he retreated to Lord Cornwallis. The British had 70 commissioned officers, and upward of 100 rank and file killed. Two hundred wounded, 29 commissioned officers, and above 500 privates prifoners, fell into the hands of the Americans, besides two pieces of artillery (first taken from the British at Saratoga, then retaken by them at Camden, and now recovered by the Americans) two standards, 800 muskets, 35 baggage waggons, and upward of 100 dragoon horses. Washington pursued Tarleton's cavalry for several miles; but the far greater part of them escaped. They joined their army in two separate divisions. One arrived in the neighbourhood of the British encampment upon the evening of the same day; the other under Tarleton appeared the next morning. Although Tarleton's corps had waged a most cruel warfare, and their progess had been marked with burnings and devastations, not a man of them was killed, wounded, or even insulted after he had surrendered. The Americans had only twelve men killed and sixty wounded.

This defeat of the troops under Tarleton, while it reanimated the despairing friends of America, and brightened their hopes, was a severe stroke to Lord Cornwallis, as the loss of his light infantry was a great disadvantage to him. The day after the event he employed in collecting the remains of Tarleton's corps, and in endeavouring to form a junction with General Leflie, who had been ordered to march towards him with a body of British troops from Wyneborough. Considerable exertions were then made by part of the army, without baggage, to retake the prifoners in the hands of the Americans, and to intercept General Morgan's corps on its retreat to the Catawba. But that American officer, after his defeat of Tarleton, had made forced marches up into the country, and crossed the Catawba the evening before a great rain, which swelled the river to such a degree, as to prevent the royal army from crossing for several days; during which time the British prifoners were got over the Yadkin; whence they proceeded to Dan River, which they also passed, and on the 14th of February had reached Court-House, in the province of Virginia.

Lord Cornwallis employed a halt of two days in collecting some flour, and in destroying numerous baggage and all his waggons, excepting those laden with hospital stores, salt, and ammunition, and four regiments empty in readiness for sick or wounded. Being thus freed from all unnecessary incumbrance, he marches marched through North-Carolina with great rapidity, through and penetrated to the remotest extremities of that province on the banks of the Dan. His progess was sometimes impeded by parties of the militia, and some skirmishes ensued, but he met with no very considerable opposition. On the 1st of February the king's troops crossed the Catawba at M'Cowan's Ford, where General Davison, with a party of American militia, was posted, in order to oppose their passage; but being falling by the first discharge, the royal troops made good their landing, and the militia retreated. When Lord Cornwallis arrived at Hillsborough, he erected the king's standard, and invited, by proclamation, all loyal subjects to repair to it, and to stand forth and take an active part in assisting his Lordship to restore order and government. He had been taught to believe that the king's friends were numerous in that part of the country: but the event did not confirm the truth of the representations that had been given. The Royalists were but few in number, and some of them too timid to join the king's standard. There were, indeed, about 200 who were proceeding to Hillsborough, under Colonel Pyle, in order to avow their attachment to the royal cause; but they were met accidentally, and surrounded by a detachment from the American army, by whom most of them were cut in pieces. Meanwhile General Greene was marching with great expedition with the troops under his command, in order to form a junction with other corps of American troops, that he might thereby be enabled to put some effectual stop to the progess of Lord Cornwallis.

In other places some considerable advantages were obtained by the royal arms. On the 4th of January, Large some ships of war with a number of transports, on quantities board which was a large body of troops under the command of Brigadier-general Arnold, arrived at W°Creford over, about 140 miles from the Capes of Virginia, by Arnold, where the troops immediately landed and marched to Richmond, which they reached without opposition, the
the militia that was collected having retreated on their approach. Lieutenant-colonel Simcoe marched from hence with a detachment of the British troops to Wil­lington, where they destroyed one of the finest found­eries for cannon in America, and a large quantity of stores and cannon. General Arnold, on his arrival at Rich­mond, found there large quantities of salt, rum, fail-­cloth, and tobacco, the last of which he destroyed to a very great amount. The British troops afterwards attacked and dispersed some small parties of the Americans, took some stores and a few pieces of cannon, and on the 20th of the same month marched into Pow­mouth. On the 25th, Captain Barclay, with several ships of war, and a body of troops under the command of Major Craig, arrived in Cape-Fear River. The troops landed about nine miles from Wilmington, and on the 28th entered that town. It was understood that their having possession of that town, and being masters of Cape-Fear River, would be productive of very ben­eficial effects to Lord Cornwallis's army.

General Greene having effected a junction about the 10th of March with a continental regiment of what were called eighteen months men, and two large bodies of militia belonging to Virginia and North-Carolina, formed a resolution to attack the British troops under the command of Lord Cornwallis. The American army marched from the High Rock Ford on the 12th of the month, and on the 14th arrived at Guildford. Lord Cornwallis, from the information he had received of the motions of the American general, concluded what were his designs. As they approached more nearly to each other, a few skirmishes ensued between some advanced parties, in which the advantage was sometimes gained by the Americans and sometimes by the British. On the morning of the 15th, Lord Corn­wallis marched with his troops at day-break in order to meet the Americans or to attack them in their encamp­ment. About four miles from Guildford, the advanced guard of the British army, commanded by Lieutenant-colonel Stuart, fell in with a corps of American rifemen, consisting of Lieutenant-colonel Lee's legion, some Back-Mountain men and Virginia militiamen, with whom he had a severe skirmish, and was, at length, obliged to retreat.

The greater part of the country in which the action happened is a wilderness, with a few cleared fields inter­spersed. The American army was posted on a rising ground about a mile and a half from Guildford court house. It was drawn up in three lines: the front line was composed of the North-Carolina militia, under the command of the generals Butler and Eaton; the second line, of Virginia militia, commanded by the generals Stephens and Lawson, forming two bri­gades; the third line, consisting of two brigades, one of Virginia and one of Maryland continental troops, commanded by General Huger and Colonel Williams. Lieutenant-colonel Washington, with the dragoons of the first and second regiments, a detachment of light infantry composed of continental troops, and a regiment of rifemen under Colonel Lynch, formed a corps of obser­vation for the security of their right flank. Lieu­tenant-colonel Lee, with his legion, a detachment of light infantry, and a corps of rifemen under Colonel Campbell, formed a corps of observation for the security of their left flank. The attack of the American army was directed to be made by Lord Cornwallis in the following order: On the right, the regiment of Bofe and the 71st regiment, led by Major-general Leffie, and supported by the first battalion of guards; on the left, the 23d and 33d regiments, led by Lieu­tenant-colonel Webster, and supported by the gren­adiers and second battalion of guards commanded by Bri­gadier-general O'Hara; the Yagers and light infantry of the guards remained in a wood on the left of the guns, and the cavalry in the road, ready to act as circumstances might require.

About half an hour after the action commenced by a cannonade, which lasted about twenty minutes; when the British troops advanced in three columns and attacked the North-Carolina bri­gades with great vigour, and soon obliged part of these troops to quit the field: but the Virginia militia gave them a warm reception, and kept up a heavy fire for a long time, till, being beaten back, the action became general almost everywhere. The American corps under the lieutenant-colonels Washington and Lee were also warmly engaged, and did considerable ex­ecution. Lieutenant-colonel Tarleton had directions to keep his cavalry compact, and not to charge with­out positive orders, excepting to protect any of the corps from the most evident danger of being defeated. The excessive thickets of the woods rendered the Bri­tish bayonets of little use, and enabled the broken corps of Americans to make frequent stands with an irregular fire. The second battalion of the guards first gained the clear ground near Guildford court-house, and found a corps of continental infantry, superior in number, formed in an open field on the left of the road. Desirous of signallizing themselves, they immediately attacked and soon defeated them, taking two fix pounders: but as they pursued the Americans into the wood with too much ardour, they were thrown into confusion by a heavy fire, and instantly charged and driven back into the field by Lieutenant-colonel Washington's dra­goons, with the loss of the two fix pounders they had taken. But the American cavalry were at first re­pulsed, and the two six pounders again fell into the hands of the British troops. The British troops having at length broken the second Maryland regiment, and turned the left flank of the Americans, got into the The American rear of the Virginia brigade, and appeared to be gaining­i them their right, which would have encircled the whole of the continental troops, when Gen. Greene thought it prudent to order a retreat. Many of the American militia dispersed in the woods; but the continental troops retreated in good order to Reedy-Fork River, and crossed at the ford about three miles from the field of action, and there halted. When they had collected their foragers, they retreated to the iron-works, ten miles distant from Guildford, where they garrisoned. They lost their artillery and two wagons laden with ammunition. It was a hard fought action, and lasted an hour and a half. Of the British troops, the losses, as stated by Lord Cornwallis, was 532 killed, wounded, and missing. General Greene in his ac­count of the action transmitted to the Congress, stated the losses of the continental troops to amount to 29 killed, wounded, and missing; but he made no estimate of the losses of the militia, which was some what more than 100. Lieutenant-colonel Stuart was killed in the ac­tion;
The British troops underwent great hardships in the course of this campaign; and in a letter of Lord Cornwallis's to Lord George Germain, dated March 17th, he observed, that "the soldiers had been two days without bread." His lordship quitted Guilford three days after the battle which was fought in that place; and on the 7th of April, after a retreat marked with proofs of great alarm and precipitation, arrived in the neighbourhood of Wilmington. Soon after, General Greene, notwithstanding his late defeat, endeavoured to make some vigorous attempts against the king's forces in South-Carolina. Lord Rawdon had been appointed to defend the post of Camden, with about 800 British and provincials; and on the 19th of April General Greene appeared before that place with a large body of continental and militia. He found it, however, impossible to attempt to form the town with any prospect of success; and therefore endeavoured to take such a position as should induce the British troops to fall back on their works. He posted the Americans about a mile from the town, on an eminence which was covered with woods, and flanked on the left by an impassable swamp. But on the morning of the 25th, Lord Rawdon marched out of Camden, and attacked General Greene in his camp. The Americans made a vigorous resistance, but were at length compelled to give way; and the pursuit is said to have been continued three miles. For some time after the action commenced, General Greene entertained great hopes of defeating the British troops; in which, as the Americans were superior in point of numbers, he would probably have succeeded, had not some capital military errors been committed by one or two of the officers who served under him. On the American side Colonel Washington had behaved extremely well in this action, having made upwards of 200 of the English prisoners, with 10 or 12 officers, before he perceived that the Americans were abandoning the field of battle. The loss of the English was about 400 killed and wounded. Upwards of 100 of the Americans were taken prisoners; and, according to the account published by General Greene, they had 126 killed and wounded. After this action, Greene retreated to Rugeley's, 12 miles from Camden, in order to collect his troops and wait for reinforcements.

Notwithstanding the advantage which Lord Rawdon had obtained over General Greene at Camden, that nobleman soon after found it necessary, having burned the goal, mills, many private houses, and a part of his own baggage, to quit that post; and the Americans made themselves masters of several other posts that were occupied by the king's troops, and the garrisons of which were obliged to surrender themselves prisoners of war. These troops were afterwards exchanged under a cartel which took place between Lord Cornwallis and General Greene for the release of all prisoners of war in the southern district. After these events, General Greene laid close siege to Ninety-six, which was considered as the most commanding and important of all the posts in the back country; but on the 19th of June he attempted to storm the garrison, but was repulsed by the gallantry of the British troops, with the loss of about 150 killed, wounded, and missing.

General Greene then raised the siege, and retired with his army behind the Saluda, to a strong situation, within 16 miles of Ninety-six.

On the 18th of April a large body of British troops, under the command of Major-general Phillips and Brigadier-general Arnold, embarked at Portfinoath in Virginia, in order to proceed on an expedition for the purpose of destroying some of the American stores. A party of light-infantery were sent 10 or 12 miles up the Chickahominy; where they destroyed several armed ships, sundry ware-houses, and the American state ships. At Petersburg, the English destroyed 4000 hogheads of tobacco, one ship, and a number of small vessels on the banks and in the river. At Chesterfield court-house, they burnt a range of barracks for 2000 men and 300 barrels of flour. At a place called O'born's, they made themselves masters of several vessels loaded with cordage and flour, and destroyed about 2000 hogheads of tobacco, and sundry vessels were sunk and burnt. At Warwick, they burnt a magazine of 500 barrels of flour, five fine mills belonging to Colonel Carey, a large range of public rope-walks and store-houses, tan and bark houses full of hides and bark, and great quantities of tobacco. A like destruction of stores and goods was made in other parts of Virginia.

From the account already given of some of the principal military operations of the present year in America, it appears, that though advantages had been gained by the royal troops, yet no event had taken place from which it could rationally be expected that the final termination of the war would be favourable to Great-Britain. It was also a disadvantageous circumstance, that there was a misunderstanding between Admiral Arbuthnot and Sir Henry Clinton, and a mutual disapprobation of each other's conduct. This was manifested from their dispatches to government, and especially from those of General Clinton, whose expressions respecting the conduct of the admiral were by no means equivocal.

On the 16th of March 1781, a partial action happened off the Cape of Virginia, between the British and one fifty-gun ship, and a French squadron consisting of the same number of ships of the line, and one forty-gun ship. Some of the ships in both fleets received considerable damage in the action, and the loss of the English was 30 killed and 73 wounded; but no ship was taken on either side. The British fleet, however, claimed the advantage; as the French were obliged to retire, and were supposed to be prevented by this action from carrying troops upon the Chickapeak, in order to attack General Arnold and impede the progress of Lord Cornwallis. But it was thought an unfortunate circumstance, that some time before this engagement the Romulus, a ship of 44 guns, was captured by the French off the Cape of Virginia.

Lord Cornwallis, after his victory over General Greene at Guildford, proceeded, as we have seen, to
Wilmington, where he arrived on the 7th of April. But before he reached that place, he published a proclamation, calling upon all loyal subjects to stand forth and take an active part in restoring good order and government; and declaring to all persons who had engaged in the present rebellion against his majesty's authority, but who were now convinced of their error, and defirous of returning to their duty and allegiance, that if they would surrender themselves with their arms and ammunition at head quarters, or to the officer commanding in the districts contiguous to their respective places of residence, on or before the 20th of that month, they should be permitted to return to their homes upon giving a military parole; they would be protected, in their persons and properties, from all forts of violence from the British troops; and would be restored, as soon as possible, to all the privileges of legal and constitutional government. But it does not appear that any considerable number of the Americans were allure by the promises to give any evidences of their attachment to the royal cause.

On the 20th of May, his Lordship arrived at Petersburg in Virginia, where he joined a body of British troops that had been under the command of Major-general Philips; but the command of which, in consequence of the death of that officer, had devolved upon Brigadier-general Arnold. Before this junction he had encountered considerable inconveniences from the difficulty of procuring provisions and forage; so that in a letter to Sir Henry Clinton, he informed him, that his cavalry wanted everything, and his infantry everything but shoes. He added, that he had experienced the difficulties of marching hundreds of miles in a country chiefly hostile, without one active or useful friend, without intelligence, and without communication with any part of the country.

On the 26th of June, about six miles from Williamsburg, Lieutenant-colonel Simcoe, and 350 of the queen's rangers, with 80 mounted yeagers, were attacked by a much superior body of the Americans; but whom they repulsed with great gallantry and with equal success, making four officers and twenty private men prisoners. The loss of the Americans in this action is said to have been upwards of 120, and that of the British troops not more than 40.

On the 6th of July an action happened near the Green Springs in Virginia, between a reconnoitring party of the Americans under General Wayne, amounting to about 800, and a large part of the British army under Lord Cornwallis; in which the Americans had 127 killed and wounded, and the loss of the royal troops is suppos'd to have been considerably greater. It was an action in which no small degree of military skill and courage was exhibited by the Americans. In a variety of skirmishes, the Marquis de la Fayette very much distinguished himself, and displayed the utmost ardour in the American cause.

In South-Carolina, an action happened on the 9th of September near the Eutaw Springs, between a large body of British troops under the command of Lieutenant-colonel Stuart and an equal body of Americans, under the command of General Greene. It was an obstinate engagement and lasted near two hours. The British, with a considerable loss, were in the first part of the battle routed in all quarters, but some having taken

polt in a piquett garden, and others thrown themselves into a brick house, the eagerness of the American pursuit was considerably checked, and gave Colonel Stuart an opportunity on the evening of the next day, to abandon the Eutaw, and march towards Charles- ton, taking a number of his wounded, and about one thousand stand of arms.

In the course of the same month, General Arnold was sent on an expedition against New-London, in Connecticut, where he destroyed a great part of the shipping, and an immense quantity of naval stores, European manufactures, and East and West India commodities. The town itself was also burnt, which is said, but untruly, to have been unavoidable, on account of the expoliations of great quantities of gun-powder which happened to be in the store-houses that were set on fire. A fort, of which it was thought necessary to gain possession in this expedition, was not taken without considerable loss. This was Fort Grifwold, which was defended by the Americans with great gallantry, and the assault was made by the English with equal bravery. The British troops entered the works with fixed bayonets, and were opposed with great vigour by the garrison with long pears. After a most obstinate defence of near forty minutes, the assailants gained possession of the fort, in which 85 Americans were found dead, and 60 wounded, most of them mortally; but of the killed, it is painful to observe, that the greater number fell after the British entered the fort, and when resistance had ceased. Of the British troops Major Montgomery was killed by a pear in entering the American works; and 192 men were also killed and wounded in this expedition.

Notwithstanding the advantages that Lord Cornwallis had obtained over the Americans, his situation in Virginia began by degrees to be very critical; and the rather because he did not receive those reinforcements and supplies from Sir Henry Clinton, of which he had formed expectations, and which he conceived to be necessary to the success of his operations. Indeed, the commander in chief was prevented from sending those reinforcements to Lord Cornwallis which he otherwise might have done, by his fears respecting New-York, against which he entertained great apprehensions that General Washington intended to make a very formidable attack. In fact, no able American general had this object in view; and while the attack was in ferment, a letter from him detailing the particulars of the intended operations of the campaign, being intercepted, fell into the hands of Sir Henry Clinton. After the plan was changed, the royal commander was so much under the impression of the intelligence contained in the intercepted letter, that he believed every movement towards Virginia to be a feint, calculated to draw off his attention from the defence of New-York. Under the influence of this opinion he bent his whole force to strengthen that post, and suffer the French and American armies to pass without any molestation. When the first opportunity of striking at them was elapsed, then for the first time he was brought to believe that the allies had fixed on Virginia, for the theatre of their combined operations. As truth may be made to answer the purposes of deception, so no feint of attacking New-York, could have been more successful than the real inten-
Number of forces.

378

All the American and French troops formed a junction at Williamsburg. The Marquis de la Fayette had been joined by 3000 under St. Simon some days before the 25th of September. The whole regular force thus collected amounted to between 11 and 12,000 men. The militia of Virginia were also called out to service, and were commanded by Gen. Nelson. On the 27th Gen. Washington gave out in general orders—"If the enemy should be tempted to meet the army on its march, the general particularly enjoins the troops to place their principal reliance on the bayonet, that they may prove the vanity of the boast which the British make of their peculiar prowess in deciding battles with that weapon." The next morning the army marched, and halted about two miles from York Town just before fun set. The officers and soldiers were ordered to lie on their arms the whole night. On the 28th, Col. Scammel (being officer of the day) in approaching the enemy's outer works, to see if they had really left them, was mortally wounded and taken prisoner by a party of the enemy's horse, which lay secreted. This day Lord Cornwallis was closely invested in York Town. The French extended from the river above the town to a morass in the centre, where they were met by the Americans, who occupied the opposite side from the river to that spot. The post at Gloucester Point was, at the same time, invested by the Duke de Lauzun with his legion, and a number of Virginia militia under General Weedon.

Before the troops left Williamsburg, Gen. Washington received a letter from the Count de Graaff, informing him that in case of the enemy's putting the fleet as well as the army in a state of marching, the count conceived it to be his duty to go out and meet them at sea, instead of fighting in a confined situation. This information exceedingly alarmed the general, who instantly saw the probability of the British fleet manoeuvring in such manner, as to reinforce or withdraw Lord Cornwallis. To prevent a measure pregnant with so much evil, his excellency wrote to the count on the 26th: "I am unable to describe the painful anxiety under which I have laboured since the reception of your letter of the 23d instant. It obliges me warmly to urge a perverence in the plan agreed upon. The attempt upon York, under the protection of your fleet, is as certain of success as a superior force and a superiority of measures can render any military operation. The capture of the British army is a matter so important in itself and in its consequences, that it must greatly tend to bring an end to the war. If your excellency quits the Bay, an acces is open to relieve York, of which the enemy will instantly avail themselves. The consequence of this will be, not only the disgrace, but the probable disbanded of the whole army; for the present feat of war being such, as absolutely precludes the use of waggons, from the great number of large rivers which intersect the country, there will be a total want of provisions. This province has been..."
Lord Cornwallis was sufficiently strong for fighting the Marquis de la Fayette, even after he had been joined by St Simou and is thought to have been mistaken in not engaging them either separately or together. The moment he heard that the allied troops arrived, he ordered his forces to retreat through North Carolina to Charleston, from thence in time, as would be done under Admiral Digby, to be true, their whole force united could be such as to give them any hope of success in the attacking your fleet. I am to press your excellency to peruse in the scheme so happily concerted between us. Permit me to add, that the absence of your fleet from the Bay may frustrate our design upon the garrison at York. For, in the present situation, Lord Cornwallis might evacuate the place with the loss of his artillery, baggage, and a few men—faecacies, which would be highly justifiable, from the desire of saving the body of the army.—The Marquis de la Fayette carries this. He is not to pass the Cape for fear of accident, in case you should be at sea. This letter, with the Marquis's persuasions, had the desired effect; and the same hour when the combined army appeared before York-Town, the French fleet was brought to the mouth of York river, and by their position effectually covered all subsequent military operations, and prevented either the retreat or succour of Lord Cornwallis's army by water. The posts of York and Gloucester were the most favourable of any in the country for besieging the British, and preventing their escape, when the siege was supported by a superior land and naval force.

Lord Cornwallis was sufficiently strong for fighting the Marquis de la Fayette, even after he had been joined by St Simou; and is thought to have been mistaken in not engaging them either separately or together. The moment he heard that the allied troops were at the Head of Elk, and that de Graffé was arrived with so powerful a fleet at the Cheapeaks, his lordship should have pushed off for Charleston. Therefore it was that General Greene wrote to Baron Steuben on the 17th—"Nothing can save Cornwallis but a rapid retreat through North Carolina to Charleston." His lordship's conduct was influenced by an expectation of a reinforcement from Sir Henry Clinton, and a full persuasion that those exertions would be made at New-York, and such a naval strength would arrive from hence in time, as would effectually relieve him. This may be gathered from his writing on the 16th: "If I had no hopes of relief, I would rather risk an action than defend my half-finished works. But as you say, Admiral Digby's hourly expected, and have promised exertions to assist me, I do not think myself justifiable in putting the fate of the war upon so desperate an attempt." He must have meant that of fighting Fayette and St Simou, for the troops of Generals Washington and Rochambeau did not arrive till afterward. Fayette had taken a strong position; but the attempt would not have appeared so desperate to his lordship, had he known the real number of the enemy covered.

The trenches were opened by the enemy's batteries on the 6th of October, at 600 yards distance from Cornwallis's works. The night being dark and rainy was well adapted to the service, in which there was not a man hurt. In the afternoon of the 9th, the redoubts and batteries being completed, a general discharge of 24 and 18 pounders and of 10 inch mortars commenced by the Americans on the right, and continued all night without intermission. The next morning, the French opened their batteries on the left, and a tremendous roar of cannon and mortars was continued for six or seven hours without ceasing. There was an incessant fire through the succeeding night. By one of the French shells, the Charon of 44 guns and a transport ship were set on fire and burnt. The following morning, the enemy's other guard ship was fired by one of the American shells and consumed. At night, the besiegers opened their second parallel, 200 yards from the works of the besieged. The Americans had 3 men killed and 1 wounded by a French cannon, which fired too low. On the 14th in the evening, an American battalion was ordered into the second parallel, and to begin a large battery in advance on the right. A few minutes before they began to break ground, the enemy kept a constant fire upon them: one of their shells burst in centre of the battalion, and killed a captain and one private, and wounded a second. The fire of the besieged was very great through the night; and it was thought that the besiegers lost as many men within 24 hours at this period, as they had done nearly the whole siege before.

Two redoubts, which were advanced about 200 yards on the left of the British, greatly impeded the progress of the combined armies. An attack on these was therefore proposed.—To excite a spirit of emulation the redoubt of the one was committed to the French, of the other to the Americans. The light infantry of the latter were commanded by the Marquis de la Fayette; and the service was allotted to a fleet corps. The Marquis said to General Washington—"The troops should retaliate on the British, for the cruelties they have practiced." The general answered—"You have full command, and may order as you please." The marquis ordered the party to remember New London, and to retaliate, by putting the men in the redoubt to the word after having carried it. The men marched to the assault with unloaded arms, at dark on the night of the 14th, passed the abatis and palisades, and attacking on all sides carried the redoubt in a few minutes, with the loss of 8 killed and 23 wounded. Lieut. Col. Laurens personally took the commanding officer. The colonel's humanity and that of the Americans fo overcame their sentiments, that they spared the British. When bringing them off as prisoners, they said among themselves—"Why! how is this! We were ordered to put them to death." Being asked by others why they had not done it, they answered—"We could not, when they begged and cried to upon their knees for their lives." About five of the British were killed, and 1 major, 1 captain, and 1 ensign, and 20 privates captured. Col. Hamilton, who conducted the enterprise with much address and intrepidity, in his report to the marquis, mentioned, to the honor of his regiment—"that, incapable of imitating examples of barbarity, and forgetting recent provocations, they spared every man that ceased to resist." The French were equally successful on their side. They carried the
the redoubt committed to them with rapidity, but left a considerable number of men. These two works being taken into the second parallel facilitated the subsequent operations.

The British were fo weakened by the fire of the combined armies, but chiefly by sickness, that Lord Cornwallis could not venture any considerable number in the making of fallies. The present emergency however was such, that a little before day break of the morning of the 16th he ordered a fortie of about 400 men, under Lieut. Col. Abercromby, to attack two batteries which appeared to be in the greatest forwardness, and to spike the guns. Two detachments were appointed to the service; and both attacks were made with such impetuosity, that the redoubts which covered the batteries, were forced, and eleven pieces of cannon spiked. The French troops, who had the guard of that part of the intrenchment, suffered considerably. This successful action did honor to the officers and troops engaged, but produced no essential benefit. The cannon, being hastily spiked, were soon rendered again serviceable; and the combined forces were fo industrious, that they finished their batteries, opened them about 4 o'clock in the afternoon, and fired briskly. Their several batteries were now covered with near 100 pieces of heavy ordnance; and the British works were fo destroyed, that they could not show a single gun.

Thus was Lord Cornwallis reduced to the necessity of preparing for a surrender, or of attempting an escape. He determined upon the latter. Boats were prepared under different pretenses, for the reception of the troops by ten at night, in order to pass them over to Gloucester Point. The arrangements were made with the utmost secrecy. The intention was to abandon the baggage, and to leave a detachment behind to capitulate for the towns near York, and for the sick and wounded, his lordship having already prepared a letter on the subject, to be delivered to Gen. Washington after his departure. The first embarkation was from Gloucester Point, and the greater part of the troops were already landed, when the weather, which was before moderate and calm, infinitely changed to a most violent storm of wind and rain. The boats with the remaining troops were all driven down the river, and the design of passing was not only entirely frustrated, but the absence of the boats rendered it impossible to bring back the troops from Gloucester. Thus weakened and divided, the army was in the most imminent danger. The boats however returned; and the troops were brought back without much loss in the course of the forenoon.

Masters were now hastening to a crisis, which could not be longer averted. The British works were sinking under the weight of the American and French artillery. The continuance of the allied fire, only for a few more hours, would reduce them to such a condition that it would be rashness to attempt their defence.—The time for expecting relief from New York was elapsed. The strength and spirit of the royal troops were worn down by constant watching, and unremitting fatigue. Lord Cornwallis therefore sent out a flag at 10 o'clock in the morning of the 17th with a letter to General Washington, requesting a capitulation of arms for twenty-four hours, and that commissioners might be appointed for digesting the terms of capitulation. An answer was given; and a reply forwarded in the afternoon; to which Gen. Washington rejoined the next day, declaring the general basis on which the capitulation might take place. Commissioners were appointed—on the side of the allies Vifcount de Noailles, and Lieut. Col. Laurens, whose father was in close confinement at the tower, while the son was drawing up articles by which an English nobleman and a British army became prisoners. While settling the terms, the vifcount wished his lordship to state, upon his honor, the value of the military chief. His lordship declared it to be about 1800l. sterling. The vifcount observed that the sum was fo trifling, that it was not worth bringing into the account, and therefore was for leaving it entirely at Cornwallis's disposal. Laurens interfered, and observed to his colleague, that though it was natural for a subject of one of the greatest monarchs in the world to think 1800l. an inconconsiderable sum, yet, for his part, being a subject of an infant state, struggling with infinite inconveniences, and where money was very rare, he must deem it a very considerable sum; and therefore he insisted that it should be accounted for. This was accordingly done; and afterward it was paid into the hands of Timothy Pickering, Esq, American quarter master general, to the amount of 2173l. 6s. sterling, estimating the dollar at 4s. 8d.—There being a manifest impropriety in the Americans fluctuating for the return of the negroes, while they themselves were avowedly fighting for their own liberties, they covered their intention of repolishing them, under the general terms with which the fourth article closed—"It is understood, that any property obviously belonging to the inhabitants of these states, in the possession of the garrison, shall be subject to be reclaimed."

The posts of York and Gloucester were surrendered on the 19th. The honor of marching out with colours of York flying, which had been denied Gen. Lincoln, was now refused to Lord Cornwallis; and Lincoln was appointed to receive the submission of the royal army at York Town, precisely in the same way his own had been conducted about 18 months before. The troops of every kind that surrendered prisoners of war, exceeded 7000 men; but such was the number of sick and wounded, that there were only 3800 capable of bearing arms. The officers and soldiers retained their baggage and effects. Fifteen hundred seamen partook of the fate of the garrison. The Guadaloupe frigate of 24 guns, and a number of transports were surrendered to the conquerors: about 20 transports had been sunk or burned during the siege. The land forces became prisoners to the congress: but the seamen and ships were assigned to the French admiral. The Americans obtained a numerous artillery, 75 brass ordnance and 69 iron cannon, howitzers and mortars.

Lord Cornwallis endeavoured to obtain permission for the British and German troops to return to their respective countries, under engagements not to serve against France or America; and also an indemnity for those who had joined him: but he was obliged to confent, that the former should be retained in the governments of Virginia, Pennsylvania and Maryland; and that the latter, whose cafe lay with the civil authority of the states, should be given up to the unconditional
The British fleet and army, defined for the relief of Lord Cornwallis, arrived off the Chesapeake on the 24th; but on receiving authentic accounts of his surrender, they returned to New York. A few days after their first return, the fleet was increased by four ships of the line; but such was the superiority of the French by de Barras’s junction with the Count Grasse, that nothing short of desperate circumstances could justify attempting a fresh engagement. These circumstances however existing, the British naval commanders used all possible expedition in refitting the ships, with the design of extirpating Cornwallis and his army. The delay occasioned by this business seemed to be compensated by the arrival of the Prince William and Torbay men of war from Jamaica. It was determined that every exertion should be used both by the fleet and army, to form a junction with the British force in Virginia. Sir Henry Clinton embarked with about 7000 of his fleet forces. It was nevertheless the 19th of October before the fleet could fall down to the Hook. They amounted to 25 ships of the line, 25 frigates, and 8 brigates. When they appeared off the Chesapeake, the French made no manner of movement, though they had 36 ships of the line, being satisfied with their present success. The main error, which paved the way to the capture of the British army, appears to be the omission of sending a larger force from the West Indies than that which was dispatched under Sir Samuel Hood. A few more ships in the first instance might have prevented that most woful disappointment with which both Sir Henry Clinton and Lord Cornwallis have been painfully exercised.

Every argument and persuasion was used with the Count de Grasse to induce him to aid the combined arms in an operation against Charleston; but the advanced season, the orders of his court, and his own engagements to be punctual to a certain time fixed for his superior operations, prevented his compliance. His instructions had fixed his departure even to the 15th of October; he however early engaged to stay longer. Could he have extended his co-operation two months more, there would most probably have been a total extirpation of the British force in the Carolinas and Georgia. On the 27th, the troops under the Marquis St Simon began to embark for the West Indies; and about the 5th of November the Count de Grasse failed from the Chesapeake.

The Marquis de la Fayette being about to leave America, the following expressions made a part of the orders included by him previous to his departure from York Town—“Orders for the first brigade of light infantry, filled by Major-General the marquis de la Fayette, Oct. 31, 1781. In the moment the major general leaves this place, he wishes once more to express his gratitude to the brave corps of light infantry, who for nine months past have been the companions of his fortunes. He will never forget, that with them alone of regular troops, he had the good fortune to manœuvre before an army, which after all its reductions, is still six times superior to the regular force he had at the time.” Four days after, this brigade embarked for the Head of Elk; the invalids of the American troops defined for the northward having previously done it. The New Jersey and part of the New York lines marched by land, and were to join the troops which went by water, at the Head of Elk. Such cavalry as were wanted by General Greene marched several days before; and on the 5th of November a reinforcement marched under Gen. St Clair, in order to strengthen him for further offensive operations in South Carolina. The season of the year was unfavorable for the return of the troops to the North river, so that they suffered much in doing it. But they and their comrades had been blest with a series of the most delightful weather from the beginning of their march toward York Town, until the reduction of the place.

No sooner had Congress received and read General Washington’s letter, giving information of the reduction of the British army, than they resolved, on the day of thanks, to Almighty God, for crowning the allied arms of the United States and France, with successes by the surrender of the whole British army under the command of Earl Cornwallis. This army had spread wails and ruin over the face of Virginia for 400 miles on the sea-coast, and for 200 to the westward. Their numbers enabled them to go where they pleased; and their rage for plunder disposed them to take whatever they esteemed most valuable. The reduction of
such an army occasioned transports of joy in the breast of every American. But that joy was increased and maintained, by the further consideration of the influence it would have in procuring such a peace as was desired. Two days after, the congress issued a proclamation for religiously observing throughout the United States, the 13th of December, as a day of thanksgiving and prayer. On the 29th of October they resolved, that thanks should be prefixed to Gen. Washington, Count de Rochambeau, Count de Graffe, and the officers of the different corps, and the men under their command, for their services in the reduction of Lord Cornwallis. They also resolved to erect in York Town a marble column, adorned with emblems of the alliance between the United States and his Most Christian Majesty; and inscribed with a succinct narrative of the surrender of the British army. Two stands of colours taken from the royal troops, under the capitulation, were prefixed to Gen. Washington in the name of the United States in Congress assembled; and two pieces of field ordnance so taken, were by a resolve of Congress, to be prefixed by Gen. Washington to Count de Rochambeau, with a short memorandum engraved thereon, “that Congress were induced to prefix them from considerations of the illustrious part which he bore in effectuating the surrender.” It was further resolved to request the Chevalier de Luzerne, to inform his most Christian Majesty, that it was the wish of Congress, that Count de Graffe might be permitted to accept a testimony of their approbation, similar to that which was to be prefixed to Count de Rochambeau. Legislative bodies, executive councils, city corporations, and many private societies, presented congratulatory propositions which were by a resolve of Congress, to be prefixed to Gen. Washington, accompanied with the warmest acknowledgments to Count de Rochambeau, Count de Graffe and the other officers in the service of his Most Christian Majesty. Places of public worship refounded with grateful praises to the Lord of Hosts, the God of battles, before, at, and after the day of thanksgiving. The singularly interesting event of captivating a second royal army, produced such strong emotions in numbers, both of ministers and people, that they could not wait the arrival of the day.

As no rational expectation now remained of a subjugation of the colonies, the military operations that succeeded in America were of little consequence. Some inconceivable actions and skirmishes did indeed take place after that event; in which the refugees chiefly distinguished themselves, and discovered an inveterate animosity against the Americans. On the 4th of May 1782, Sir Guy Carleton arrived at New-York, being appointed to the command of the British troops in America in the room of Sir Henry Clinton. Two days after his arrival, he wrote a letter to General Washington, acquainting him, that Admiral Digby was joined with himself in a commission to treat of peace with the people of America; transmitting to him, at the same time, some papers tending to manifest the pacific disposition of the government and people of Britain towards those of America. He also desir'd a passport for Mr Morgan, who was appointed to transmit a similar letter of compliment to the congress. General Washington declined signing any passport till he had taken the opinion of congress upon that measure; and by them he was directed to refuse any passport for such a purpose. However, another letter was sent to General Washington, dated the 2d of August, signed by Sir Guy Carleton and Rear-admiral Digby, in which they informed him, that they were acquainted by authority that negotiations for a general peace had already commenced at Paris; that Mr Grenville was invested with full powers to treat with all the parties at war; and was then at Paris in the execution of his commission. They farther informed him, that his Britannic Majesty, in order to remove all objections to that peace which he ardently wished to restore, had commanded his ministers to direct Mr Grenville, that the independency of the thirteen provinces should be propounded by him, in the first instance, instead of making it the condition of a general treaty. But some jealousies were entertained by the Americans, that it was the design of the British court either to divide them, or to bring them to treat of a peace separately from their ally the king of France: they therefore resolved, that any man, or body of men, who should presume to make any separate or partial convention or agreement with the king of Great-Britain, or with any commissioner or commissioners under the crown of Great-Britain, ought to be considered and treated as open and avowed enemies of the United States of America; and also that those states could not with propriety hold any conference or treaty with any commissioners on the part of Great Britain, unless they should, as a preliminary thereto, either withdraw their fleets and armies, or else, in positive or express terms, acknowledge the independence of the said states. They likewise resolved, that any propositations which might be made by the court of Great Britain, in any manner tending to violate the treaty subsisting between them and the king of France, ought to be treated with every mark of indignity and contempt.

In the month of June, the town of Savannah, and different places in Georgia, were evacuated by the British troops; as was also Charleston, South-Carolina, about the close of the year. In the mean time, the negotiations for peace being continued, provisional articles of peace were signed at Paris on the 30th of November by the commissioner of his Britannic Majesty and the American commissioners, in which his Majesty acknowledged the united colonies of New-Hampshire, Massachusetts-Bay, Rhode-Island, and Providence Plantations, Connecticut, New-York, New-Jersey, Pennsylvania, Delaware, Maryland, Virginia, North-Carolina, South-Carolina, and Georgia, to be free, sovereign, and independent states. They had constituted themselves such on the 4th of July 1776; they had been acknowledged such by the French king on the 30th of January 1778, when he concluded with them a treaty of amity and commerce; Holland had acknowledged them as such April 19th 1782; Sweden acknowledged them as such February 5th 1783; Denmark the 25th February, Spain in March, and Russia in July, the same year.

The Definitive Treaty was signed on the 3d of September 1783, and in Aug. Sir Guy Carleton had received his final orders for the evacuation of New-York. Tuesday, November the 25th, was the day agreed upon for this evacuation. To prevent every disorder which might arise,
America. [625] America.

which might otherwise enue from such an event, the American troops under the command of Gen. Knox marched from Haerlem to the Bowery in the morning. They remained there till about one o'clock, when the British forces left the posts in the Bowery, and the Americans marched forward and took possession of the city. This being effected, Gen. Knox and a number of citizens on horseback rode to the Bowery to receive their Excellencies, Gen. Washington and Gen. Clinton, who, with their suites, made their public entry into the city on horseback; followed by the lieutenant-governor and the members of council, for the temporary government of the southern district, four abreast—Gen. Knox and the officers of the army eight abreast—citizens on horseback, eight abreast—the speaker of the assembly and citizens on foot, eight abreast. The procession ceased at Cape's tavern. The governor gave a public dinner at Frances's tavern; at which the commander in chief and other general officers were present. The arrangements for the whole business were so well made and executed, that the most admirable tranquility succeeded through the day and night. Soon after this event, the soldiers of the American army, cheerfully renouncing the character of citizens, returned peaceably to their respective homes; while their beloved and ever-honoured commander, having taken a pathetic leave of his officers, repaired to Annapolis, and, on the 23d of December, at an audience with Congress (perhaps the most munificent and interesting that ever occurred) rising with great dignity, he delivered this address.

"—Mr. President, The great events on which my resignation depended having at length taken place, I now have the honour of offering my sincere Congratulations to Congress, and of presenting myself before them, to surrender into their hands the trust committed to me, and to claim the indulgence of retiring from the service of my country.

"Happy in the confirmation of our independence and sovereignty, and pleased with the opportunity afforded the United States, of becoming a respectable nation, I resign with satisfaction the appointment I accepted with diffidence—a diffidence in my abilities to accomplish so arduous a task; which however was superseded by a confidence in the gratitude of our enemies, the support of the supreme power of the union, and the patronage of Heaven.

"The successful termination of the war has verified the most sanguine expectations; and my gratitude for the interposition of Providence, and the assistance I have received from my countrymen, increases with every review of the momentous contest.

"While I repeat my obligations to the army in general, I should do injustice to my own feelings not to acknowledge in this place, the peculiar services and distinguished merits of the gentlemen who have been attached to my person during the war. It was impossible the choice of confidential officers to compose my family should have been more fortunate. Permit me, Sir, to recommend in particular those who have continued in the service to the present moment, as worthy of the favorable notice and patronage of Congress.

"I consider it as an indispensable duty to close this last act of my official life by commending the interests of our dearest country to the protection of Almighty God, and those who have the superintendence of them to his holy keeping.

"Having now finished the work assigned me, I retire from the great theatre of action, and bidding an affective farewell to this august body, under whose orders I have so long acted, I here offer my commission, and take my leave of all the employments of public life."

"The general was so powerfully impressed, with the great and interesting scenes that crowded in upon his imagination while speaking, that he would have been scarce able to have uttered more than the closing period. He advanced and delivered to the president his commission, with a copy of his address. Having resumed his place, he received in a solemn posture the following answer of Congress; which the president delivered with elegance; but not without such a sensibility as changed, and spread a degree of palesness over his countenance.

"Sir, The United States in Congress assembled receive, with emotions too affecting for utterance, the solemn resignation of the authorities under which you have led their troops with success through a perilous and a doubtful war. Called upon by your country to defend its invaded rights, you accepted the sacred charge, before it had formed alliances, and whilst it was without funds or a government to support you. You have conducted the great military contest with wisdom and fortitude, invariably regarding the rights of the civil power through all difficulties and changes. You have by the love and confidence of your fellow-citizens, enabled them to display their martial genius, and transmit their fame to posterity. You have persevered, till these United States, aided by a magnificent king and nation, have been enabled under a just Providence, to close the war in freedom, safety, and independence; on which happy event we sincerely join you in congratulations.

"Having defended the standard of liberty in this new world; having taught a lesson useful to those who inflat and to those who feel oppression, you retire from the great theatre of action, with the blessings of your fellow-citizens—but the glory of your virtues will not terminate with your military command, it will continue to animate remotest ages.

"We feel with you our obligations to the army in general, and will particularly charge ourselves with the interests of those confidential officers, who have attended your person to this affecting moment.

"We join you in commending the interests of our dearest country to the protection of Almighty God, beseeching him to diffuse the hearts and minds of its citizens, to improve the opportunity afforded them, of becoming a happy and respectable nation. And for we address to him our earnest prayers, that a life so beloved, may be fostered with all his care; that your days may be happy as they have been illustrious; and that he will finally give you that reward which this world cannot give."

Having thus resigned his commission into the hands of the president of that honourable body, he retired from public life amid the acclamations of his grateful and admiring countrymen.

According to the report of the committee appointed for that purpose, the Foreign Debt of the United men and States incurred by the war, amounted to 7,885,083 dollars, the war.
America dollars, and the *Domestic Debt* to $34,115,290, total at 45. 6d. each, equal to 9,450,084. Sterling, the interest of which at 6 per., cent. is $57,003. But the cost to Great Britain is moderately computed at $115,654,914, and the additional annual burden by it $4,557,771. since January 1775. As to the losses of men during the war, the States of America, it is suspected, lost by the sword and in prison near 80,000 men, and by the British returns at New-York, the number of soldiers killed in the service amounted to 42,633.

Of the extent of territory, population, commerce, revenues and wealth of this growing empire; and, also, of the rise, progress, and establishment of the present happy form of government, a particular account shall be given, under the article United States.

**AMERICAN NIGHT-SHADE.** See Phytolacca. **AMERICAN GROUND-NUT.** See Arrachis. **AMERICUS VESPUCIUS,** a Florentine gentleman, from whom America derived its name.—The merchants of Seville having obtained permission to attempt discoveries as private adventurers, sent out four ships in 1499, in the command of the noble Ojeda de Ojeda (who had accompanied Columbus on his second voyage), assisted by Americus Vespucius, who was known to be deeply skilled in the science of navigation. This fleet touched on part of that western continent already discovered by Columbus, whose track Ojeda followed; and Americans, who was a man of much address, as well as possessed of considerable literary talents, by publishing the first voyages on the subject, and other artful means, gave his name to the New-World, in prejudice to the illustrious Genoese. The improviso, though long detected, has been falsified by time; and the fourth division of the globe, so long unknown to the inhabitants of Europe, Asia, and Africa, still continues to be distinguished by the name of America.

**AMERSFORT,** a city in the Netherlands, in the province of Utrecht, seated on the river Ems, E. Long. 5° 20'. N. Lat. 52° 14'. The most remarkable things are, the town-house; the grand palace, which is triangular; the public walk, planted with trees; and the great church, dedicated to St. George. The land to the east and fourth of this city is very fruitful; on the north there is nothing but pasture-ground, and on the west it is woody. Not far from hence is a mountain called Anversfortberg, on which they have planted a villa of trees, which reaches to Utrecht.

**AMERSHAM,** or ACHMENDESCHAM, a market-town in Buckinghamshire, consisting of about 200 houses, with a free-school, and four alm-houses. It sends two members to parliament, and has a market on Tuesday. It is a rectory rated at 481. 16s. 8d. in the king's books. The market-house is a very handsome structure. W. Long. 0° 15'. N. Lat. 51° 47'.

**AMES (William, D. D.)** a learned independent divine, famous for his controvertial writings, was born in 1576, and educated at Chelth's college, in Cambridge. In the reign of King James I. he left the university, and soon after the kingdom, on account of his being unwilling to conform to the rules of the church; and retired to the Hague, where he had not been long before he was invited to the command of Alphonso divinity-chair in the university of Franeker, in Friesland, which he filled with admirable abilities for above twelve years; during which his fame was so great, that many came from remote nations to be educated under him. He from the first removed to Rotterdam for a change of air, which his health demanded; and here he continued during the remainder of his life. His controversial writings, which compose the greatest part of his works, are chiefly against Bellarmine and the Armenians. He also wrote, 1. A Fresh Suit against the Ceremonies. 2. *Lections Históricas Davidis.* 3. *Lectores Theologie,* and several pieces relative to the sciences. He died of an asthma, at Rotterdam, in Nov. 1632.

**AMESTRATA,** a town of Sicily, (Cicero); Amestrats, (Stephanus); Amestra (Silius Italicus); Multistrats, (Polybius): Now Mistretta, in the Val di Demona, on the river Halefus. It was a very strong fort of the Carthaginians, besieged in vain by the Romans for seven months with considerable losses; at length, after another siege taken and razed (Diodor. Siculus).

**AMETHYST,** a transparent gem of a purple colour, which seems composed of a strong blue and a deep red, and, according as either of these prevails, affording different tinges of purple, sometimes approaching to violet, and sometimes even fading to a pale-rose colour. Though the amethyst is generally of a triple colour, it is nevertheless sometimes found naturally coloured, and may at any time be easily made by putting it into the fire; in which pellucid or colourless state, it so resembles the diamond, that its want of hardneff seems the only way of distinguishing it. Some derive the name amethyst from its colour, which resembles wine mixed with water; whilst others, with more probability, think it got its name from its supposed virtue of preventing drunkenness; an opinion which, however imaginary, prevailed to that degree among the ancients, that it was usual for great drinkers to wear it about their necks. Be this as it will, the amethyst is (scarce inferior to any of the gems in the beauty of its colour; and in its purest state is of the same hardnefs, and at least of equal value, with the ruby and sapphire.

It is found of various sizes, from the bigness of a small vetch, to an inch and an half in diameter, and often to much more than that in length. Its shape is extremely various, sometimes roundish, sometimes oblong, and at others flattened, at least on one side; but its most common appearance is in a cryttalliform figure, consisting of a thick column, composed of four plants, and terminated by a flat and short pyramid, of the same number of sides; or else, of a thinner and longer hexagonal column; and sometimes of a long pyramid, without any column. It makes the gayest figure in the last of these flates, but is harder and most valuable in the roundish and pebble-like form. The amethyst is found in the East and West-Indies, and in several parts of Europe; the oriental ones, at least some of the finer specimins, being so hard and bright as to equal any of the coloured gems in value. However, by far the greater number of amethyfts fall infinitely short of these; as all the European ones, and not a few of those brought from the East and West-Indies, are very little harder than common crytals.

**Counterfeit or Falsities Amethyst.** Spars and crystals tinged red and yellow, &c. are sold for amethyfts. The false ones come from Germany, and can be purified by vapours in the mines, and contain some lead. Amethyfts may be counterfeited by glass, to which
Amethy M**[ 627 ]** M

Amethyst Ambar.

\[\text{Amethyst}\]

\[\text{Ambar.}\]

the proper colour or stain is given. There were fine ones made in France about the year 1690, which may even impose on connoisseurs, unless the stone be taken out of the collet.—The method of giving this colour to glafs is directed as follows: Take chrysyal-frit, made with the most perfect and fine tarde: Then prepare a mixture of manganese in powder, one pound; and zaffer prepared, one ounce and a half: Mix these powders well together; and add to every pound of the frit an ounce of this powder. Let it be put into the pots with the frit, not into the already made metal. When the whole has stood enough in fusion to be perfectly pure, work it into vessels, and then will reftemble the colour of the amethyst.

Amethy M

Amethyst in heraldry, a term for the purple colour in the coat of a nobleman, in use with those who blazon with precious plants; and, in the 42d order, Verticillata. The characters are: The calyx consists of a single-leaved perianthium, bell-shaped, angular, semiflammulat, and peltifer: The corolla is monopetalous; the border quinquenartic, the lowest division more expanding: The flamina consists of two slender filaments approximated; the antherae are simple and roundish: The pellifimum has a four-cleft germin; fylbus, the size of the flamina; fligmat, two, acute: no corolla: the feeds, four, gibbous, and shorter than the calyx:—there is only one known species.

This plant is a native of Siberia, from whence the seeds were sent to the imperial garden at Petersburg, and thence carried to Britain. It is an annual plant, with an upright stalk, which rises above a foot high. Towards the top it puts forth two or three small lateral branches, garnished with small trifid leaves, sawed on their edges, of a very dark green colour. The flowers appear in June or July, and are produced in small umbels at the extremities of the branches. They are of a fine blue colour, as are also the upper part of the branches, and the leaves immediately under the umbels, so that they make a fine appearance.

Calamagrostis. The feeds of the amethystea should be sown in autumn, as they are apt to remain a whole year in the ground, if kept till the spring. When the plants come up, nothing else is necessary than to keep them clear of weeds, and to thin them where they are too close. They ought to be sown where they are apt to remain, as they do not thrive when transplanted.

Amethystine is applied, in antiquity, to a kind of purple garment dyed of the hue of amethyst. In this sense amethystine differed from Tyrant as well as from hyacinthe purple, being a kind of medium between both.

Amhar, or Amhara, a province of Abyssinia, in the year 1690, which may even impose on connoisseurs, unless the stone be taken out of the collet.—The method of giving this colour to glasses is directed as follows: Take chrysyal-frit, made with the most perfect and fine tarze: Then prepare a mixture of manganese in powder, one pound; and zaffer prepared, one ounce and a half: Mix these powders well together; and add to every pound of the frit an ounce of this powder. Let it be put into the pots with the frit, not into the already made metal. When the whole has stood enough in fusion to be perfectly pure, work it into vessels, and then will resemble the colour of the amethyst.

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Amhar, or Amhara, a province of Abyssinia, said to extend 40 leagues from east to west. It is considered as the most noble in the whole empire, both on account of its being the usual residence of the Abyssinian monarchs, and having a particular dialect different from all the rest, which, by reason of the emperors being brought up in this province, has become the language of the court and of the politer people. Here is the famed rock Amba-arishen, where the young monarchs were formerly confined. See Amha.

Amhurst (Nicholas), an English poet and political writer, was born at Marden in Kent, and entered St John's college Oxford, from whence he was expelled for irregularity of conduct and libertine principles. Retaining great resentment against the university on this account, he abated its learning and discipline, and some of the most respectable characters in it, in a poem published in 1724. called Oczias Britannica, and in a book intituled Terra Fitis. He published a Niffelany of Poems, sacred and profane; and, The Convocation, a poem in five cantos, which was a satire on the Bishop of Bangor's antagonists. But he is best known for the satire he had in the political paper called The Crafism: though, after having been the drudge of his party for near 20 years, he was as much forgotten in the famous compromise of 1742 as if he had never been born; and, when he died in that year of a broken heart, was indebted to the charity of his bookkeeper for a grave.

Amianthus, or Earth-flax, in natural history, a fibrous, flexible, elastic, mineral substance, consisting of short, abrupt, and interwoven filaments. It is found in Germany, in the strata of iron ore, sometimes forming veins of an inch in diameter. Its fibres are so flexible that cloth has been made of them, and the shorter filaments that separate in the washing of the flax may be made into paper in the common manner. For the method of its preparation for manufacture into cloth, see ASBESTOS.

Amianthus is classed by Mr Kirwan in the marianic genus of earths, because it contains a fifth part of magnesia. Its other constituents, are, flint, mild calcareous earth, barytes, clay, and a very small proportion of iron. It is fusible per se in a strong heat, and also with the common fluxus. It differs from asbestos in containing some ponderous earth. 

Amicable, in a general sense, denotes any thing done in a friendly manner, or to promote peace.

Amicable. In Roman antiquity, were, according to Piticus, lower and lesser honourable seats allotted for the judices pedantes, or inferior judges, who, upon being admitted of the emperor's council, were dignified by him with the title amicus.

Amicable Numbers, such as are mutually equal to the sum of one another, and another part. Thus the numbers 284 and 220 are amicable numbers: for the aliquot parts, 1, 2, 4, 5, 10, 11, 22, 20, 44, 55, 110, of 220, are together equal to the other number 284; and the aliquot parts 1, 2, 4, 7, 14, of 284, are together equal to 220.

Amicus, in Roman antiquity, was any upper garment worn over the tunica.

Amicus, among ecclesiatical writers, the uppermost garment anciently worn by the clergy; the other being the alba, singulum, flola, manipulus, and planeta. The amicus was a linen garment, of a square figure, covering the head, neck, and shoulders, and buckled or clasped before the breast. It is still worn by the religious abroad.

Amiculum, in Roman antiquity, a woman's upper garment, which differed from the pala. It was worn both by matrons and courtesans.

Amicus curie, a law-term, to denote a bystander who informs the court of a matter in law that is doubtful or mistaken.

Amida, a god worshipped by the Japanese, who

\[4K2\]
Amiens, a large handomc city of France, the capital of Picardy. It is agreeably situated on the river Somme, and said to have received its Latin name Ambiaium from being every where encompassed with water. It is a place of great antiquity; being mentioned by Caesar as a town that had made a vigorous resistance against the Romans, and where he convened a general assembly of the Gauls after having made himself master of it. The emperors Antoninus and Marcus Aurelius enlarged it; and Constantine, Conflans, Julian, and several others, refided here a considerable time. The town is enclosed with a wall and other fortifications; and the ramparts are planted with trees, which from a delightful walk. The river Somme enters Amiens by three different channels, under as many bridges; and these channels, after washing the town in several places, where they are of use in its different manufactures, unite at the other end by the bridge of S. Michael. Here is a quay for the boats that come from Abbeville with goods brought by sea. At the gate of Noyon there is a faburb remarkable for the abbey of S. Achen. Next to this gate you come to that of Paris, where they have a long mall between two rows of trees. The houses are well built; the streets spacious, embellished with handomc squares and good buildings; and the number of inhabitants between 40,000 and 50,000. The cathedral, dedicated to our Lady, is one of the largest and most magnificent churches in France; adorned with handomc paintings, fine pillars, chapels, and tombs; particularly the nave is greatly admired. The other places worth seeing are the palace of the bailiwic, the town-hou...
AMMODYTES, a name given to a spacious hall in the palace of the Great Mogul, where he gives audience to his subjects, and where he appears on solemn festivals with extraordinary magnificence. His throne is supported by six large steps of maffy gold, set with rubies, emeralds, and diamonds, estimated at 60,000,000,000.

AMMA, among ecclesiastical writers, a term used to denote an abbess, or spiritual mother.

AMMANT, or AMMANT, in the German or Belgian policy, a judge who has the cognizance of civil causes. — It is also used among the French for a public notary, or officer who draws up instruments and deeds.

AMMANIA: A genus of the monogynia order, belonging to the tetrandria class of plants; and in the natural method ranking under the 17th order, Calycanthema. The characters are: The calyx is an oblong, erect, bell-shaped perianthium, with eight stam, quinquangular, ocoladentated, and persistent: The corolla is either wanting, or it consists of four ovate expanding petals inserted in the calyx: The flaminia consists of four bristly filaments the length of the calyx; the anthers are didymous: The pistillata is a roundish four-celled capsule, covered by the calyx: The seeds are numerous and small. — Of this genus there are three species enumerated: all of them natives of warm climates. They have no beauty or other remarkable property.

AMMI, BISHOP'S-WEED: A genus of the diphylia order, belonging to the pentalandia class of plants; and ranking, in the natural method, under the 45th order, Umbellata. The characters are: Of the calyx the universal umbel is manifold; the partial one short and crowded; the involucra are pinnatifid, with numerous leaflets: The corolla are radiated, and all hermaphrodite: The flaminia consists of five capillary filaments; the anthers are oblong: There is no pericarpium: The fruit is roundish, polished, frigidated, small, and papyraceous. The seeds are two, plano-convex, and frigidated. Of this there are three species.

1. The major, or common bishop's-weed, the seeds of which are used in medicine. The glaucifolium, with all its leaves cut in the shape of a spear.
2. The coticum, or Egyptian bishop's-weed.

Culture, &c. The first is an annual plant; and therefore is to be propagated by seeds sown in the autumn, in the place where the plants are to remain. They will flower in June, and the seeds will ripen in August. This plant will grow in any open situation, but thrives best in a light sandy soil. The second is perennial, and very hardy. It thrives best in a moist soil, and may be propagated by seeds in the same manner as the former.

The third species is now no other wise known than by the figure of its seeds, which were formerly used in medicine, but have long since given place to theof the common kind. The seeds of the ammi-coticum are small, frigidated, of a reddish brown colour, and have a warm pungent taste, and a plesant smell approaching to that of origanum. They are recommended as fomentific, carminative, and diuretic; but have long been strangers to the shops. The seeds of the ammi-majus, which are used in their place, are much weaker both in taste and smell, and without the origanum flavour of the other.

AMMIANUS (Marcellinus), a Grecian and a soldier as he calls himself, was born at Antioch, and flourished under Constantius and the preceding emperors as late as Theodosius. He served under Julian in the East; and wrote in Latin an interesting history, from the reign of Nerva to the death of Valens, in 31 books of which only 18 remain. Though a Pagan, he speaks with candour and moderation of the Christian religion, and even praises it: his hero is the emperor Julian. He died about the year 390. The best edition of his history is that of Gronovius, in 1693.

AMMIRATO (Scipio), an eminent Italian historian, born at Lecco in Naples in 1531. After travelling over great part of Italy, without settling to his satisfaction, he was engaged by the great duke of Tuscany to write The History of Florence; for which he was pretented to a canonry in the cathedral there. He wrote other works while in this station; and died in 1600.

AMMOCHRYSOS, from ammos, sand, and χρυσός, gold, a name given by authors to a stone very common in Germany, and seeming to be composed of a golden sand. It is of a yellow gold-like colour, and its particles are very glossy, being all fragments of a coloured tale. It is usually so soft as to be easily rubbed to a powder in the hand; sometimes it requires grinding to powder in a mortar or other wise. It is used only as sand to fire over writing. The Germans call it katez-gold. There is another kind of it, less common, but much more beautiful, consisting of the same fort of gjoy fangles, but those not of a gold colour, but of a bright red, like vermillion.

AMMODYTES, or SAND-EEL, in ichthyology, a genus of fishes belonging to the order of apodes. This fish resembles an eel, and seldom exceeds a foot in length. The head of the ammodytes is compressed and narrower than the body; the upper jaw is larger than the under; the body is cylindrical, with scales hardly perceptible. There is but one species of the ammodytes, viz. the tobiasian, or lance, a native of Europe. This fish gathers itself into a circle, and where the water is left, at the depth of about a foot; and is in some places dug out, in others drawn up by means of a hook contrived for that purpose. They are commonly used as baits for other fish, but they are also very delicate eating. These fish are found in the stomach of the Porpois; an argument that the last roots up the sand with its nose, as the dogs do the ground.

AMMON, anciently a city of Mamraica (Ptolemy). Ammon calls it a place, not a city, in which stood the temple of Jupiter Ammon, which there was nothing but sandy wastes. Pliny says, That the oracle of Ammon was 12 days journey from Memphis, and among the Nomis of Egypt he reckons the Nomis Ammoniacus: Diodorus Siculus, That the district where the temple stood, though surrounded with desarts, was watered by dews which fell nowhere else in all that country. It was agreeably adorned with fruitful trees and springs.
Ammon. springs, and full of villages. In the middle of the Acropolis stood a citadel, encompassed with a triple wall; the first an inclosure of which contained the palace; the others the apartments of the women, the relations and children, as also the temple of the god, and the sacred fountain for lustrations. Without the acropolis stood, at no great distance, another temple of Ammon, shaded by a number of tall trees: near which was a fountain, called that of the fan, or Solis Fons, because subject to extraordinary changes according to the time of the day; morning and evening, was very cold, at midnight extremely hot. A kind of foif felt was said to be produced here. It was dug out of the earth in large oblong pieces, sometimes three fingers in length, and transparent as crystal. It was thought to be a present worthy of kings, and used by the Egyptians in their sacrifices. From this our sal ammoniac has taken its name.

Ammon, or Hammon, in heathen mythology, the name of the Egyptian Jupiter, worshipped under the figure of a ram.

Bacchus having subdued Asia, and passing with his army through the deserts of Africa, was in great want of water; but Jupiter, his father, assuming the shape of a ram, led him to a fountain, where he refreshed himself and his army; in gratitude for which favour, Bacchus built there a temple to Jupiter, under the title of Ammon from the Greek, αμωμον, which signifies sand, alluding to the sandy desert where it was built. In this temple was an oracle of great note, which Alexander the Great consulted, and which lafted till the time of Theodosius.

Hammon the god of the Egyptians, was the same with the Jupiter of the Greeks; for which reason these latter denote the city which the Egyptians call No-Hammon, or the habitation of Ammon, Diospolis, or the city of Jupiter. He is thought to be the same with Ham, who peopled Africa, and was the father of Mizraim, the founder of the Egyptians.

Ammon, or Ben-Ammi, the son of Lot, begot by that patriarch upon his youngest daughter (Gen. xix. 38.) He was the father of the Ammonites, and dwelt to the coast of the Dead Sea, in the mountains of Gilgal, Ammon, Moab, and Ammonites.

Ammon (Andreas), an excellent Latin poet, born at Luca in Italy, was sent by Pope Leo X. to England, in the characters of prothoneo of the Apostolick See, and collector-general of the kingdom. Being a man of singular genius and learning, he soon became acquainted with the principal literati of those times; particularly with Erasmus, Colet, Grocyn, and others, for the sake of whose company he resided some time at Oxford. The advice which Erasmus gives him, in regard to pursuing his fortune, has a good deal of humour in it, and was certainly intended as a satire on the artful methods generally practised by the selfish and ambitious part of mankind: “In the first place (says he), throw off all sense of shame; thrust yourself into every one’s business, and elbow out whomsoever you can; neither love nor hate anyone; measure every thing by your own advantage; let this be the scope and drift of all your actions. Give nothing but what is to be returned with surry, and be complacent to every body. Have always two strings to your bow. Feign that you are solicited by many from abroad, and get every thing ready for your departure. Show letters inviting you Ammonites elsewhere, with great promises.” Ammon was Latin secretary to Henry VIII. but at what time he was appointed does not appear. In 1512 he was made canon and prebendary of the collegiate chapel of St Stephen, in the palace of Westminister. He was likewise prebendary of Wells; and in 1514 was presented to the rectory of Dychial in that diocese. About the same time, by the king’s special recommendation, he was also made prebendary of Salibury. He died in the year 1517, and was buried in St Stephen’s chapel in the palace of Westminister. He was esteemed an elegant Latin writer, and an admirable poet. The epistles of Erasmus to Ammon abound with encomiums on his genius and learning. His works are, 1. Epistole ad Eranimus, lib. 1. 2. Scotici confititus historia, lib. 1. 3. Buottte vel solane, lib. 1. Brasii 1546. 4. De rebus nihil, lib. 1. 5. Panegyricus guidan, lib. 1. 6. Variorum epigrammata, lib. 1. 7. Perspecta diversa, lib. 1.

Ammoniac, a concrete gummy resinous juice, brought from the East-Indies, usually in large masses, composed of little lumps or tears, of a milky colour, but soon changing, upon being exposed to the air, of a yellowish hue. We have no certain account of the plant which affords this juice; the seeds usually found among the tears, resemble those of the umbelliferous clafs. It has been, however, alleged, and not without some degree of probability, that it is an exudation from a species of the Peucedanum, another species of which produces the affafoidea. The plant producing it is said to grow in Nubia, Abyssinia, and the interior parts of Egypt. It is brought to the western part of Europe from Egypt, and to England from the Red-Sea, by some of the ships belonging to the East-India Company trading to those parts. Such tears as are large, dry, free from little stones, seeds, or other impurities, should be picked out, and preferred for internal use: the coarser kind is purified by solution and colature, and then carefully precipitating it; unless this be artfully managed, the gum will lose a considerable deal of its more volatile parts. There is often vended in the shops, under the name of gum-ammoniacum, a composition of ingredients of much effect. Ammoniac has a nauseous sweet taste, followed by a bitter one; and a peculiar smell, somewhat like that of galbanum, but more grateful: it softens in the mouth, and grows of a whiter colour upon being chewed. Thrown upon live coals, it burns away in flame: it is in some measure soluble in water and in vinegar, with which it assumes the appearance of milk; but the resinous part, amounting to about one half, subides on standing. Ammoniac is an useful deobstruent, and frequently prescribed for opening obstructions of the abdominal visceria, and in hysterial disorders occasioned by a deficiency of the menstrual evacuations. It is likewise supposed to deterge the pulmonary vessels; and proves of considerable service in some kinds of athesmas, where the lungs are oppressed by vitid plhlegm: in this intention, a solution of gum-ammoniac in vinegar affords a medicine of great efficacy, though not a little unpleasant. In long and obstinate cholics proceeding from vitid matter lodged in the intestines, this gummy retin has produced happy effects, after the purges and
Ammoniac, the common carminatives had been used in vain. Ammoniac is most commodiously taken in the form of pills; about a scruple may be given every night, or oftener. Externally, it softens and ripens hard tumours; a solution of it in vinegar stands recommended by some for resolving even obnoxious swellings. A plaster made of it and fquill-vinegar is recommended by some in white swellings. A dilute mixture of the same is likewise rubbed on the parts, which are also fumigated with the smoke of juniper-berries. In the shops is prepared a solution of it in pennyroyal water called from its milky colour fquill-ammoniac. It is an ingredient also in the squill pills.

Salt-Ammoniac, a volatile salt, of which there are two kinds, ancient and modern. The ancient fort, described by Pliny and Dioscorides, was a native salt, generated in those large innumerable caravanserai where the crowd of pilgrims, coming from the temple of Jupiter Ammon, used to lodge; who, in those parts, traveling on camels, and those creatures when in Cyrene, a province of Egypt, where that celebrated temple stood, urinating in the flables, or (lay fome) in the parched sands, out of this urine, which is remarkably strong, arose a kind of salt, denominated sometimes (from the temple) Ammoniac, and sometimes (from the country) Cyreniac. Since the ceffation of these pilgrimages, no more of this salt is produced there; and, from this deficiency, some fuppect there never was any fuch thing: But this fuppicion is removed, by the large quantities of a salt, nearly of the fame nature, thrown ont by the modern sal-ammoniac is entirely different.

Ammonian philosophy. See Ammonius.

Ammonite, in natural history. See Cornu Ammonis.

AMMONITES, a people descended from Ammon the son of Lot. The Ammonites destroyed those giants which they called Zamzummims (Deut. ii. 19—21.), and feized upon their country. God forbade Moses, and by him the children of Israel (id. 19.), to attack the Ammonites; because he did not intend to give their lands unto the Hebrews. Before the Israelites entered the land of Canaan, the Amorites had by conquest got great part of the countries belonging to the Ammonites and Moabites. This Moses retook from the Amorites, and divided between the tribes of Gad and Reuben. In the time of Jephtha, the Ammonites declared war against the Israelites (Judges xii.) under pretence that they detained a great part of the country which had formerly been theirs before the Amorites possessed it. Jephtha declared, that as this was an acquisition which the Israelites had made in a just war, and what they had taken from the Amorites, who had long enjoyed it by right of conquest, he was under no obligation to restore it. The Ammonites were not satisfied with this reason; wherefore Jephtha gave them battle and defeated them. The Ammonites and Moabites generally united whenever there was any design set a-foot of attacking the Israelites. After the death of Othnel (id. iii.), the Ammonites and Moabites joined with Eglon king of Moab to oppress the Hebrews; whom they subdued and governed, for the space of 18 years, till they were delivered by Ehud the Son of Gera, who slew Eglon king of Moab. Some time after this, the Ammonites made war against the Israelites, and greatly distressed them. But these were at last delivered by the hands of Jephtha; who having attacked the Ammonites, made a very great slaughter among them (chap. xi.). In the beginning of Saul's reign (1 Sam. xi.), Naash king of the Ammonites having fallen down before Jabeel-gilead, reduced the inhabitants to the extremity of demanding a capitulation. Naash answered, that he would capitulate on this condition, that every one who submitted to him should have his right eye plucked out, that so they might be made a reproach to Israel; but Saul coming feanonly to the relief of Jabeel, delivered the city and people from the barbarity of the king of the Ammonites. David had been the king of Ammon's friend; and, after the death of this prince, he sent ambassadors to make his compliments of condolence to Hanun his son and successor; who, imagining that David's ambassadors were come as spies to observe his strength, and the condition of his kingdom, treated them in a very injurious manner (2 Sam. x. 4.). David revenged this indignity thrown upon his ambassadors, by lading the Ammonites, the Moabites, and the Syrians, and their allies. Ammon and Moab continued under the obedience of the kings David and Solomon; and, after the separation of the ten tribes, were subject to the kings of Israel till the death of Ahab in the year of the world 3107. Two years after the death of Ahab, Jehoram his son, and successor of Ahaziah, defeated the Moabites (2 Kings iii.) but it does not appear that this victory was so complete as to reduce them to his obedience. At the same time, the Ammonites, Moabites, and other people, made an irruption upon the lands belonging to Judah; but were forced back and routed by Jehoahaz (2 Chr. xx. 1, 2). After the tribes of Reuben, Gad, and the half-tribe of Manasseh, were carried into captivity by Tiglath-pileter in the year 3344, the Ammonites and Moabites took possession of the cities belonging to these tribes. Jeremiah (xlvi. 1.) reproaches them for it. The ambassadors of the Ammonites were some of those to whom this prophet (chap. xxvii. 2—4.) presented the cup of the Lord's fury, and directed to make bonds and yokes for themselves; exhorting them to submit themselves to Nebuchadnezzar, and threatening them, if they did not, with captivity and slavery. Ezekiel (xxv. 4—10.) denounces their entire destruction; and tells them that God would give them up to the people of the eait, who should-fet their palaces in their country, so that there should be no more mention of the Ammonites among the nations. It is believed that these misfortunes happened to the Ammonites in the fifth year after the taking of Jarusalem, when Nebuchadnezzar made war against all the people that dwelt upon the confines of Judea, in the year of the world 3420.

It is also thought probable, that Cyrus gave the Ammonites and Moabites the liberty of returning into their own country, from whence they had been removed by Nebuchadnezzar; for we see them, in the place of their former settlement, exposed to those revolutions which were common to the people of Syria and Palestine; subjects sometimes to the kings of Egypt, and at other times to the kings of Syria. We are told by Polybius, that Antiochus the Great took Rabbah,
AMMONITIS (anc. geo.), a country of Arabia Petraea, occupied by the children of Ammon, whence the appellation. It limits, partly to the west, and partly to the north, where the river Jabbok, whose course is nowhere determined; though Josephus says, that it runs between Rabbath-Ammon, or Philadelphia, and Gerafæ, and falls into the Jordan.

AMMONIUS, surnamed Saccas, was born in Alexandria, and flourished about the beginning of the third century. He was one of the most celebrated philosophers of his age; and, adopting with alterations the Ecclesiastic philosophy, laid the foundations of that sect which was distinguished by the name of New Platonism. See ECCLEOTICS and PLATONISM.

This learned man was born of Christian parents and educated in their religion; the outward profession of which, it is said, he never entirely deserted. As his genius was vast and comprehensive, so were his projects bold and singular: For he attempted a general coalition of all sects, whether philosophical or religious, by framing a system of doctrines which he imagined calculated to unite them all, the Christians not excepted, in the most perfect harmony. In pursuance of this design, he maintained, that the great principles of all philosophical and religious truth were to be found equally in all sects; that they differed from each other only in the method of expressing them, and in some opinions of little or no importance; and that, by a proper interpretation of their respective sentiments, they might easily be united into one body. Accordingly, all the Gentile religions, and even the Christian, were to be illustrated and explained by the principles of this universal philosophy; and the fables of the priests were to be removed from Paganism, and the comments and interpretations of the disciples of Jesus from Christianity. In conformity to this plan, he insisted, that all the religious systems of all nations should be restored to their original purity, and reduced to their primitive standard, viz. the ancient philosophy of the East, preserved uncorrupted by Plato: and he affirmed, that this project was agreeable to the intentions of Jesus Christ; whose sole view in descending upon earth was to set bounds to the reigning superstition, to remove the errors that had blended themselves with the religion of all nations, but not to abolish the ancient theology from which they were derived. He therefore adopted the doctrines which were received in Egypt concerning the universe and the Deity, considered as constituting one great whole; concerning the eternity of the world, the nature of souls, the empire of Providence, and the government of the world by demons. He also established a system of moral discipline; which allowed the people in general to live according to the laws of their country and the dictates of nature; but required the wise to exalt their minds by contemplation, and to mortify the body, so that they might be capable of enjoying the presence and assistance of the Deity, and of attending, after death to the presence of the Supreme Parent. In order to reconcile the popular religions, and particularly the Christian, with this new system, he made the whole history of the Heathen gods an allegory; maintaining that they were only celestial ministrers, intituled to an inferior kind of worship. And he acknowledged that Jesus Christ was an excellent man, and the friend of God; but alleged that it was not his design entirely to abolish the worship of demons, and that his only intention was to purify the ancient religion. This system, so plausible in its first rise, but so comprehensive and complying in its progress, has been the source of innumerable errors and corruptions in the Christian church. At its first establishment it is said to have had the approbation of Athenagoras, Panegyricus, and Clemens the Alexandrian, and of all who had the care of the public school belonging to the Christians at Alexandria. It was afterwards adopted by Longinus the celebrated author of the treatise on the Sublime, Plotinus, Herennius, Origen, Porphyry, Jamblichus, the disciple of Porphyry, Sophater, Eudius, Eustathius, Maximus of Ephesus, Pricius, Chrysantheus the master of Julian, Julian the Apologist, Hierocles, Proclus, and many others, both Pagans and Christians.

The above opinions of Ammonius are collected from the writings and disputations of his disciples, the modern Platonists; for he himself left nothing in writing behind him; nay, he imposed a law upon his disciples not to divulge his doctrines among the multitude; which injunction, however, they made no scruple to neglect and violate.

AMMONIUS, surnamed Lithotome, a celebrated surgeon of Alexandria; so called from his inventing the operation of extracting the stone from the bladder.

AMMCTION, a general name for all warlike provisions; but more particularly powder, ball, &c.

Ammunition, arms, utensils of war, gun-powder, imported without licence from his Majesty, are, by the laws of England, forfeited, and triple the value. And again, such licence obtained, except for furnishing his Majesty's public store, is void, and the offender to incur a premunire, and to be disabled to hold any office from the crown.

AMMUTION Bread, Shoes, &c. such as are served out to the soldiers of an army or garrison.

AMNERY, in matters of policy, denotes a pardon granted by a prince to his rebellious subjects, usually with some exceptions: such was that granted by Charles II. at his restoration.—The word is formed from the Greek αμνεία, the name of an edict of this kind published by Thrasibulus, on his expulsion of the tyrants out of Athens.

ANNIS, in anatomy, a thin pellucid membrane which surrounds the fœtus in the womb. See Fortis.

AMOEBAEUM, in ancient poetry, a kind of poem repre-
AMO

rep resenting a dispute between two persons, who are made to answer each other alternately; such are the third and seventh of Virgil's eclogues.

AMOL, a town of Asia, in the country of the Ubes, seated on the river Gihon. E. Long. 64° 30'. N. Lat. 39° 20'.

AMOMUM, GINGER: A genus of the monogynia order, belonging to the monadrica clas of plants. The characters are: The calyx is an obscure three-toothed perianthium, above: The corolla is monopetalous, the tubus short, the limbus tripartite: The stamina is an oblong filament, with the anthera adjoining: The pistillum has a roundish germen, beneath; the stylus is filiform, the stigma obtuse: The pericarpium is leathery, subovate, trigonous, trilocular, and three-valved: The seeds are numerous.—Of this genus there are four

Species. 1. The zingiber, or common ginger, is a native of the East, and also of some parts of the West Indies; where it grows naturally without culture. The roots are jointed, and spread in the ground: they put out many green reed-like stalks in the spring, which arise to the height of two feet and an half, with narrow leaves. The flower-stems arise by the side of these, immediately from the root: these are naked; ending with an oblong scaly spike. From each of these scales is produced a single blue flower, whose petals are but little lower than the squamous covering. 2. The zingiber, or wild ginger, is a native of India. The roots are larger than those of the first, but are jointed in the same manner. The stalks grow from three to near four feet high, with oblong leaves placed alternately. The flower-stems arise immediately from the root: these are terminated by oblong, blunt, scaly heads; out of each scale is produced a single white flower, whose petals extend a considerable length beyond the scaly covering. 3. The cardamomum, or cardamom, is likewise a native of India; but is little known in Europe except by its seeds, which are used in medicine. Of this there is a variety, with smaller fruit, which makes the distinction into cardamomum major and minor. The first, when it comes to us, is a dried fruit or pod about an inch long, containing, under a thick skin, two rows of small triangular seeds of a warm aromatic flavour. The cardamomum minus is a fruit scarce half the length of the foregoing, but considerably stronger both in smell and taste. 4. The granada paradisi species is likewise a native of the East Indies. The fruit containing the grains of paradise is about the size of a fig, divided into three cells, in each of which are contained two roots of small seeds like cardamoms. They are somewhat more grateful, and considerably more pungent, than cardamoms.

Culture. The first two species are tender, and require a warm stove to preserve them. They are easily propagated by planting the roots in the spring. These should be planted in pots filled with light rich earth, and plunged into a hot-bed of tanner's-bark, where they must constantly remain. If we may believe the Abbé Raynal, cardamoms propagate themselves, in those countries where they are natives, when either sowing or planting. Nothing more is required than, as soon as the rainy season is over, to set fire to the herb which has produced the fruit.

U/21. The dried roots of the first species are of great use in the kitchen, as well as in medicine. They furnish a considerable export from some of the American islands. The green roots, preserved as a sweet-meat, are preferable to every other kind. The Indians mix them with their rice, which is their common food, to correct its natural impurity. This spice, mixed with others, gives the dishes seasoned with it a strong taste, which is extremely disagreeable to strangers. The Europeans, however, who come into Asia without fortune, are obliged to conform to it. The others adopt it out of complaisance to their wives, who are generally natives of the country.—Ginger is a very useful spice, in cold flatulent colics, and in laxity and debility of the intestines; it does not heat so much as those of the pepper kind, but its effects are much more durable. The cardamoms and grains of paradise have the same medicinal qualities with ginger.—In Jamaica, the common people employ it in baths and fomentations with good success, in complaints of the visceras, in pleurisies, and in obstathe and continued fevers.

AMOMUM VERUM, or True Amomum, is a round fruit, about the size of a middling grape, encircled under a membranous cover, a number of small round angular seeds, of a blackish brown colour on the outside, and whitish within: the seeds are lodged in three distinct cells; those in each cell are joined closely together, so that the fruit, upon being opened, appears to contain only three seeds. Ten or twelve of these fruits grow together in a cluster; and adhere without any pedicle, to a woody stalk about an inch long; each single fruit is surrounded by five leaves, in form of a cup; and the part of the stalk void of fruit is clothed with leafy scales.—The husks, leaves, and stems, have a light grateful smell, and a moderately warm aromatic taste: the seeds, freed from the husks, are in both respects much stronger; their smell is quick and penetrating, their taste pungent, approaching to that of camphor. Notwithstanding amomum is an elegant aromatic, it has long been a stranger to the shops.

AMOMUM VULGARE. See SISO.

AMONTONS (William), an ingenious experimental philosopher, was born at Paris in 1663. While he was at the grammar-school, he by sickness contracted a deafness that almost excluded him from conversation. In this situation, he applied himself to mechanics and geometry; and, it is said, refused to try any remedy for his disorder, either because he deemed it incurable, or because it increased his attention. He studied the nature of barometers and thermometers with great care; and wrote Observations and Experiments concerning a new Hour-glass, and concerning Barometers, Thermometers, and Hygroscopes; which, with some pieces in the Journal des Sçavans, are all his literary works. When the Royal academy was new-regulated in 1699 he was admitted a member; and read his new Theory of Friction, in which he happily cleared up an important object in mechanics. He died in 1705.

AMORES, a sort or order of gromatic doctors, or commentators on the Jerusalem Talmud. The Amoreans succeeded the Mithnian doctors. They subsisted 250 years; and were succeeded by the Sebuanians.

VOL. I.

AMORGOS,
AMORGOS, or AMORGUS (anc. geog.), now Morgo, not far from Naxus to the east, one of the European Sporades; the country of Simonides the Iambic poet. To this island criminals were banished. It was famous for a fine flax called Emorgus.

AMORITES, a people descended from Amor, according to the Septuagint and Vulgate; Emarœus, according to other expositors; Æmar, according to the Hebrew; or Emorite, according to our version of the Bible; who was the fourth son of Canaan, Gen. x. 16.

The Amorites first of all peoples the mountains lying to the west of the Dead Sea. They had likewise establishments to the east of the same sea, between the brooks of Jabock and Arnon, from whence they forced the Ammonites and Moabites. Num. xiii. 30. xxi. 29. Josh. v. 1, and Judges xi. 19, 20. Moses made a conquest of this country from their kings Sihon and Og, in the year of the world 2553.

The prophet Amos (i. 6.), speaking of the gigantic flavour of the Amorites, compares their height with that of cedars, and their strength with that of an oak. The name Amorite is often taken in Scripture for all Canaanites in general. The lands which the Amorites possessed on this side Jordan were given to the tribe of Judah, and those which they had enjoyed beyond this river were distributed between the tribes of Reuben and Gad.

AMORIUM, a town of Phrygia Major, near the river Sangarius, on the borders of Galatia. It was taken from the Romans by the Saracens in 668; but soon after retaken by the Romans. A war breaking out again between these two nations in 827, the Roman emperor Theophilus destroyed Sozopetra the birth-place of the khalif Al' Motafem, notwithstanding his earnest intreaties to him to spare it. This so enraged the khalif, that he ordered every one to engrave upon his shield the word Amorium, the birthplace of Theophilus, which he resolved at all events to destroy. Accordingly he laid siege to the place, but met with a vigorous resistance. At length, after a siege of 55 days, it was betrayed by one of the inhabitants who had abjured the Christian religion. The khalif, exasperated at the loss he had sustained during the siege, put most of the men to the sword, carried the women and children into captivity, and levelled the city with the ground. His forces being dilater for want of water on their return home, the Christian prisoners rose upon some of them, and murdered them; upon which the khalif put 6000 of the prisoners to death. According to the eastern historians, 30,000 of the inhabitants of Amorium were slain, and as many carried into captivity.

AMORPHA, FALSE INDIGO: A genus of the decandria order, belonging to the diadelphia class of plants; and in the natural method ranking under the 22d order, Papilionacæ. The characters are: The calyx is a single-leaved perianthium, tubular and persistent; the corolla consists of an ovate, concave, erect petal, scarcely larger than, and placed on the upper side of the calyx; the flower consists of ten erect and equal stamens, longer than the corolla; the anthers are simple; the pistillum has a roundish germ; the style subulate, and the length of the stigma simple: The pericarpium is a lunula unilocular legumen, reflected, larger than the calyx, and tuberculaté: The seeds are two, and kidney-shaped. By the corolla alone this genus may be distinguished from all the known plants in the universe.

The petals are the banner; the wings and keel are wanting, which is very singular in a papilionaceous corolla.

Of this there is only one known species, a native of Carolina, where the inhabitants formerly made from it a coarse kind of indigo, whence the plant took its name. It rises, with many irregular stems, to the height of 12 or 14 feet. The leaves are late in the spring before their foliage is fully displayed. The ends of their branches are generally destroyed by the frost; or, if they recover it, they have the appearance of being dead; whilst other plants testify the effects of the reviving months. But notwithstanding these defects, this tree has some other good properties that in part make amends for the losses. Its leaves, when out, are admired by all. They are of a pleasant green colour; are very large, beautifully pinnated, the foliages being arranged along the stalk by pairs, and terminate by an odd one. The flowers are of a purple colour; they grow in spikes, seven or eight inches long, at the ends of the branches, and are of a singular structure. In order to make this tree have its best effect, it should be planted among others of its own growth, in a well-sheltered situation; by which means the ends will not be so liable to be destroyed by the winter's frosts; the branches will not suffer by the violence of the winds; and, as it is subject to put out many branches near the root, these indelicacies and imperfections will be concealed; whilst the tree will show itself to the utmost advantage when in blow, by elevating its purple-spiked flowers amongst the others in a pleasing view.

Culture. The amorpha is most readily propagated by seeds. It may also be propagated by laying down the young branches, which in one year will make good roots; and may then be taken off, and planted either in the nursery, or in the places where they are destined to remain. If they are put into a nursery, they should not remain there more than one year; for as the plants make large shoots, they do not remove well when they have remained long in a place.

AMORTIZATION, in law, the alienation of lands or tenements to a corporation or fraternity, and their successors. See Mortmain.

AMOS, the fourth of the small prophets, who in his youth had been a herdman in Tekoa, a small town about four leagues southward of Jerusalem, was sent to the kine of Bethan, that is, to the people of Samaria, or the the kingdom of Israel, to bring them back to repentance, and an amendment of their lives; whence it is thought probable that he was born within the territories of Israel, and only retired to Tekoa on his being driven from Bethel, by Amaziah the priest of the golden calves at Bethel.

The prophet being thus retired to Tekoa, in the kingdom of Judah, continued to prophesy. He complains in many places of the violence offered him, and endeavours to oblige him to silence. He boldly reproaches against the crying sins that prevailed among the Israelites, as idolatry, oppression, wantonness, and obstinacy.
The burning. It is capable of a very high and sublime in the cause Jotham, the son of Joah, king of Israel, two years before the earthquake (Amos i. 1.), which happened in the 24th or 25th year of Uzziah, according to the rabbi- and moss of the modern commentators; or the year of the world 3219. when this prince usurped the glory and their number and great quality in the town of Tekoa, whither he retired. He fore-portions of the tabernacle of David, and erecting the king- are those of the 7th chapter: the finest is in Lancashire and Cheshire; it lies usually at considerable depths. It makes a very brisk fire, flaming violently for a short time, and after that continuing red and glowing hot a long while; and finally is reduced into a small proportion of grey ashes, the greater part of its substance having flown off in the burning. — It is capable of a very high and elegant polish; and, in the countries where it is produced, is turned into a vast number of toys, as full-boxes and the like, which bear all the nicety of turning, and are made to pass for jet. — Husbandmen smear their vines with it, as it kills the vermin which infests them. It is likewise used for the dyeing of hair black. In medicine it is reputed good in colics, against worms, and of being in general an emollient and diffusent; but the present practice takes no notice of it.

**AMPELIANUS** (anc. geog.) a promontory of Mauritania Tingitana, called Cottes by the natives, which is of the same signification with a town of the same name not far from the River Lixus, near the straits of Gibraltar: now Cape-Spartel. W. Long. 6o. N. Lat. 36°. 0.

**AMPHERNES**, in antiquity, a kind of vessels where- in the rowsers plied two oars at the same time, one with the right hand and the other with the left.

**AMPHIATHROSI S**, in anatomy, a term for such junctures of bones as have an evident motion, but different from the diarthros, &c. See **DIARTHROSIS**.

**AMPHIARAUS**, in pagan mythology, a celebrated prophet, who possessed part of the kingdom of Argos.
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Amphibia. He was believed to excel in divining by dreams, and is said to be the first who divined by fire. Amphiarus, knowing, by the spirit of prophecy, that he would lose his life in the war against Thebes, hid himself in order to avoid engaging in the expedition; but his wife Erphyle, being prevailed upon by a present, discovered the place in which he had concealed himself; so that he was obliged to accompany the other princes who marched against Thebes. This proved fatal to him; for the earth being split asunder by a thunder-bolt, both he and his chariot were swallowed up in the opening. Amphiarus, after his death, was ranked among the gods; temples were dedicated to him; and his oracle, as well as the sports instituted to his honour, were very famous.

AMPHIBIA, in zoology, the name of Linnaeus's third class of animals; including all those which live partly in water and partly on land. This class he subdivides into four orders, viz. The amphibia reptiles; the amphibia ferpentes; the amphibia nantes; and the amphibia manentes. See ZOOLOGY.

It has been a question whether the animals commonly called amphibia, live most in the water or on land. If we consider the words amsbibs (astringe, both ways), and amphis (viva life), from whence the term amphibia is derived; we should understand, that animals, having this title, should be capable of living as well by land, or in the air, as by water; or of dwelling in either constantly at will: but it will be difficult to find any animal that can fulfill this definition, as being equally qualified for either. An ingenious naturalist, therefore, from considering their economy respectively, divides them into two orders, viz. 1. Such as enjoy their chief functions by land, but occasionally go into the water. 2. Such as chiefly inhabit the water, but occasionally go ashore. What he advances on this subject is curious, and well illustrates the nature of this class.

1. Of the first order, he particularly considers the phocae; and endeavours to shew, that none of them can live chiefly in the water, but that their chief enjoyment of the functions of life is on shore.

These animals (he observes) are really quadrupeds; but as their chief food is fish, they are under a necessity of going out to sea to hunt their prey, and to great distances from shore; taking care that, however great the distance, rocks or small islands are at hand, as resting-places when they are tired, or when their bodies become too much macerated in the water; and they return to the places of their usual resort to sleep, copulate, and bring forth their young, for the following reasons, viz. It is well known, that the only essential difference (as to the general structure of the heart) between amphibia and mere land animals, or such as never go into the water, is, that in the former, the oval hole remains always open. Now, in such as are without this hole, if they were to be immersed in water for but a little time, respiration would cease, and the animal must die; because a great part of the mafs of blood passes from the heart by the pulmonary artery through the lungs, and by the pulmonary veins returns to the heart, while the rest is carrying the greater part of the mafs to the head and extremities, &c.

Now, the blood passes through the lungs in a continual uninterrupted stream, while respiration is gentle and moderate: but when it is violent, then the circulation is interrupted, for inspiration and expiration are only between these two violent actions that the blood can pass: and hence it is, that the lives of animals are shortened and their health impaired, when they are subjected to frequent violent respiration; and thus it is, that when animals have once breathed, they must continue to respire ever after, for life is at an end when that ceases.

There are three necessary and principal uses of respiration in all land-animals, and in those kinds that are counted amphibious.—The first is that of promoting the circulation of the blood through the whole body and extremities. In real fishes, the force of the heart is not capable of sending the blood to every part, as they are not furnished with limbs or extremities; but in the others mentioned, being all furnished with extremities, respiration is an affiitant force to the arteries in sending blood to the extremities; which, being so remote from the heart, have need of such assistance, otherwise the circulation would be very languid in these parts; thus we see, that in persons subject to asthmatic complaints, the circulation grows languid, the legs grow cold and oedematous, and other parts suffer by the defect in respiration.—A second use of breathing is, that, in inspiration, the variety of particles, of different qualities, which float always in the air, might be drawn into the lungs, to be inhaled into the mafs of blood, being highly necessary to temperament and cool the agitated mafs, and to contribute refined pabulum to the finer parts of it, which, meeting with the daily supply of chyle, serves to assimilate and more intimately mix the mafs, and render its constitution the fitter for supporting the life of the animal. Therefore it is, that valetudinarians, by changing foul, or unwholesome air, for a free, good, open air, often recover from lingering diseases.—A third principal use of respiration is, to promote the exhibition of voice in animals; which all those that live on the land do according to their specific nature.

From these considerations it appears, that the phoca of every kind, or are under an absolute necessity of making the land their principal residence. But there is another very convincing argument why they reside on shore the greatest part of their time; namely, that the flesh of these creatures is analogous to that of other land animals: and therefore, by over-long maceration, added to the fatigue of their chafing their prey, they would suffer such a relaxation as would destroy them. It is well known, that animals which have lain long under water, are reduced to a very lax and even putrid state; and the phoca must bark in the air on shore: for while the solids are at rest, they acquire their former degree of tension, and the vigour of the animal is restored; and while he has an uninterrupted placid respiration, his blood is refreshed by the new supply of air, as explained above, and he is rendered fit for his next cruise: for action wastes the most exalted fluids of the body, more or less, according to its duration and violence; and the restorative rest must continue a longer...
Let us now examine by what power these animals are capable of remaining longer under water than land-animals.

All these have the oval hole open between the right and left arteries of the heart; and, in many, the carinalis arteriosus silfo; and while the phoca remains under water, which he may continue an hour or two more or less, his respiration is stopped; and the blood, not finding the passage through the pulmonary artery free, rushes through the hole from the right to the left artery, and partly through the arterial canal, being a short passage to the aorta, and thence to every part of the body, maintaining the circulation; but, upon rising to come ashore, the blood finds its passage again through the lungs the moment he respires.

Thus the fetus in utero, during its confinement, having the lungs compressed, and consequently the pulmonary arteries and veins impeded, has the circulation of the blood carried on through the oval hole and the carinalis silfo. Now, if the phoca be thrown into the water, and the fetus in utero, are analogous; but they differ in other material circumstances. One is, that the fetus having never respired, remains sufficiently nourished by the maternal blood circulating through him, and continues to grow till the time of his birth, without any want of respiration during nine months confinement: the phoca, having respired the moment of his birth, cannot live very long without it, for the reasons given before; and this hole and canal would be closed in them, as it is in land-animals, if the dam did not, soon after the birth of the cub, carry him so very frequently into the water, to teach him; by which practice these passages are kept open during life, otherwise they would not be capable of attaining the food designed for them by Providence.

Another difference is, that the phoca, as was said before, would be relaxed by maceration in remaining too long in the water; whereas the fetus in utero suffers no injury from continuing its full number of months in the fluid it swims in: the reason is, that water is a powerful solvent, and penetrates the pores of the skins of land-animals, and in time can dissolve them; whereas the liquor amnii is an infudial fluid, impregnated with particles more or less mucilaginous, and utterly incapable of making the least alteration in the cutis of the fetus.

Otters, beavers, and some kinds of rats, go occasionally into the water for their prey, but cannot remain very long under water. "I have often gone to shoot otters (says our author), and watched all their motions: I have seen one of them go softly from a bank into the river, and dive down; and in about two minutes rise, at 10 or 15 yards from the place he went in, with a mudding salmon in his mouth, which he brought on shore. I shot him, and faved the fish whole." Now, as all fetuses have these passages open, if a whelp of a true water-animals was immediately after its birth, served as the phoca does her cubs, and immersed in water, to stop respiration for a little time every day, it is probable that the hole and canal would be kept open, and the dog be made capable of remaining as long under water as the phoca.

Frogs, how capable of remaining in the water, yet cannot avoid living on land, for they respire; Amphibia, or short time, according to the quantity of the previous fatigue.

The lizard kind, such as may be called water-lizards (see Lacerta), are all obliged to come to land, in order to deposite their eggs, to feed, and to sleep. Even the crocodiles, who dwell much in rivers, sleep and lay their eggs on shore; and, while in the water, are compelled to rise to the surface to breathe; yet, from the texture of his scaly covering, he is capable of remaining in the water longer by far than any species of the phoca, whose skin is analogous to that of a horse or cow.

The hippopotamus (See Hippopotamus), who wades into the lakes or rivers, is a quadruped, and remains under the water a considerable time; yet his chief residence is upon land, and he must come on shore for respiration.

The teftudo, or sea-tortoise (see Testudo), though he goes out to sea, and is often found far from land; yet, being a respiring animal, cannot remain long under water. He has indeed a power of rendering himself specifically heavier or lighter than the water, and therefore can let himself down to avoid an enemy or a storm: yet he is under a necessity of rising frequently to breathe, for reasons given before; and his most usual situation, while at sea, is upon the surface of the water, feeding upon the various substances that float in great abundance every where about him; these animals sleep securely upon the surface, but not under water; and can remain longer at sea than any other of this class, except the crocodile, because, as it is with the latter, the covering is not in danger of being too much macerated; yet they must go on shore to copulate and lay their eggs.

2. The consideration of these is sufficient to inform us of the nature of the first order of the class of amphibious animals; let us now see what is to be said of the second in our division of them, which are such as chiefly inhabit the waters, but occasionally go on shore.

These are but of two kinds: the eels, and water serpents or snakes of every kind. It is their form that qualifies them for loco-motion on land, and they know their way back to the water at will; but by their structure they have a strong perisaltic motion, by which they can go forward at a pretty good rate: whereas all other kinds of fish, whether vertical or horizontal, are incapable of a voluntary loco-motion on shore; and therefore, as soon as such fishes are brought out of the water, after having flounced a while, they lie motionless, and soon die.

Let us now examine into the reason why these various kinds of fish, the eel and serpent kinds, can live a considerable time on land, and the vertical and horizontal kinds die almost immediately when taken out of the water: and, in this research, we shall come to know what analogy there is between land animals and those of the waters. All land-animals have lungs, and can live no longer than while these are inflated by the ambient air, and alternately compressed for its expulsion; that is, while respiration is duly carried on, by a regular inspiration and expiration of air.

In like manner, the fish in general have, instead of lungs, gills or branchiae; and as in land-animals the lungs have a large portion of the mafs of blood circulating through them, which must be flopped if the air has...
Amphibia. has not a free ingress and egress into and from them; so, in fish, there is a great number of blood-vessels that pass through the branchiae, and a great portion of their blood circulates through them, which must in like manner be totally dried up, if the branchiae are not perpetually wet with water. So that, as the air is to the lungs in land-animals a constant affinit to the circulation; so is the water to the branchiae of those of the rivers and seas: for when these are out of the water, the branchiae very soon grow crisp and dry, the blood-vessels are shrunk, and the blood is obstructed in its passage; so when the former are immered in water, or otherwise prevented from having respiration, the circulation ceases and the animal dies.

Again, as land-animals would be destroyed by too much maceration in water; so fishes would, on the other hand, be ruined by too much excitation; the latter being from their general structure and constitution, made fit to bear, and live in, the water; the former, by their constitution and form, to breathe and dwell in the air.

But it may be asked, why eels and water-snakes are capable of living longer in the air than the other kinds of fish? This is answered, by considering the providential care of the great Creator for these and every one of his creatures: for since they were capable of locomotion by their form, which they need not be if they were never to goon shore, it seemed necessary that they should be rendered capable of living a considerable time on shore, otherwise their locomotion would be in vain. How is this provided for? Why, in a most convenient manner; for this order of fishes have their branchiae well covered from the external drying air; they are also furnished with a slimy mucous, which hinders their becoming crisp and dry for many hours; and their very skins always emit a mucous liquor, which keeps them supple and moist for a long time: whereas the branchiae of other kinds of fish are much exposed to the air, and want the slimy matter to keep them moist. Now, if any of these, when brought out of the water, were laid in a vessel without water, they might be preserved alive a considerable time, by only keeping the gills and surface of the skin constantly wet, even without any water to swim in.

It has been advanced, that man may, by art, be rendered amphibious, and able to live under water as well as frogs. As the focus lives in upero without air, and the circulation is there continued by means of the foramen ovale; by preferring the passage open, and the other parts in status quo, after the birth, the same faculty would still continue. Now, the foramen, it is alleged, would be preferred in its open state, were people accustomed, from their infancy, to hold their breath a considerable time once a-day, that the blood might be forced to resume its pristine passage, and prevent its drying up as it usually does. This conjecture feems, in some measure, supported by the practice of divers, who are taught from their childhood to hold their breath, and keep long under water, by which means the ancient channel is kept open. A Calabrian monk at Madrid laid claim to this amphibious capacity, making an offer to the king of Spain, to continue twice twenty-four hours under Water, without ever coming up to take breath. Kircher gives an account of a Sicilian, named the ffish Cola, who, by a long habitude from his youth, had so accustomed himself to live in water, that his nature seemed to be quite altered; so that he lived rather after the manner of a fish than a man.

AMPHIBIOLOGY, in grammar and rhetoric, a term used to denote a phrase susceptible of two different interpretations. Amphibiology arises from the order of the phrase, rather than from the ambiguous meaning of a word.

Of this kind was that answer which Pyrrhus received from the oracle: Aio te, Macedonas vincerem poefis; where the amphibiology consists in this, that the words te and Macedonas, may either of them precede, or either of them follow, the words vincerem, indefinitely. See ORACLE.

The English language usually speaks in a more natural manner, and is not capable of any amphibologies of this kind: nor is it so liable to amphibologies in the articles, as the French and most other modern tongues. AMPHIBRACHYS, in ancient poetry, the name of a foot consisting of three syllables, whereof that in the middle is long, and the other two short; such is the word [âbârè].

AMPHICOME, in natural history, a kind of figured stone, of a round shape, but rugged, and beset with eminences, celebrated on account of its use in divination. The word is originally Greek ἀμφίκομε, q. d. utrique comenta, or "hairy on all sides." This stone is also called Eretylos, ἐρετύλος, Amatoria, probably on account of its supposed power of creating love. The amphibome is mentioned by Democritus and Pliny, though little known among the moderns. Mercatius takes it for the same with the lapis lumbricatus, of which he gives a figure.

AMPHICTYONS, in Grecian antiquity, an assembly composed of deputies from the different states of Greece: and resembling, in some measure, the diet of the German empire. Some suppose the word ἀμφιττυόν to be formed of ἀμφίως, "about," and ττυόν or φτως, in regard the inhabitants of the country about met here in council: others, with more probability, from ἀμφιττύων, of Deucalion, whom they suppose to have been the founder of this assembly: though others, will have Acronis, king of the Argives, to have been the first who gave a form and laws to it.

Authors give different accounts of the number of the Amphictyons, as well as of the states who were entitled to have their representatives in this council. According to Strabo, Harpocrates, and Suidas, they were twelve from their first institution, sent by the following cities and states; the Ionians, Dorians, Per- rhaebians, Boeotians, Magnesians, Achaæans, Phthians, Melians, Dolopians, Ælianians, Delphians, and Phocians. Æschines reckons no more than eleven; instead of the Achaæans, Ælianians, Delphians, and Dolopians, he only gives the Thessalians, Oetians, and Loerians. Last, Panatanas's list contains only ten, viz. the Ionians, Dolopians, Thessalians, Ælianians, Magnesians, Melians, Phthians, Dorians, Phle- ians, and Loerians.

In the time of Philip of Macedon, the Phocians were excluded the alliance, for having plundered the Delphian temple, and the Lacedemonians were admitted in their place; but the Phocians, 60 years after, having behaved gallantly against Brennus and his Gauls, were restored to their seat in the Amphictyonic council.
admitted into the body; and to make room for it, the Magnesians, Melians, Phthians, and Amniadians, who till then had distinct voices, were ordered to be numbered with the Thessalians, and to have only one common voice. Strabo speaks as if this council were extinct in the times of Augustus and Tiberius: but Pausanias, who lived many years after, under Antoninus Pius, affures us it remained entire in his time, and that the number of Amphictyons was then 30.

The members were of two kinds. Each city sent two deputies, under different denominations; one called Amphidromon, whose business seems to have been more immediately to inspect what related to sacrifices and ceremonies of religion; the other Pleomono, charged with hearing and deciding of causes and differences between private persons. Both had an equal right to deliberate and vote, in all that related to the common interests of Greece. The hieromnemon was elected by lot; the pygerys by plurality of voices.

Though the Amphictyons were first instituted at Thermopylae, M. de Valois maintains, that their first place of residence was at Delphi; where, for some ages, the tranquillity of the times found them no other employment than that of being, if we may so call it, church-wardens of the temple of Apollo. In aftertimes, the approach of armies frequently drove them to Thermopylae, where they took their station, to be nearer at hand to oppose the enemies progress and order timely succour to the cities in danger. Their ordinary residence, however, was at Delphi.

Here they decided all public disputes and differences between any of the cities of Greece; but before they entered upon business, they jointly sacrificed an ox cut into small pieces, as a symbol of their union. Their determinations were received with the greatest veneration, and even held sacred and inviolable.

The Amphictyons, at their admission, took a solemn oath never to divest any city of the right of deputation; never to avert its power to bequeath the temple of Apollo; never to avert its worship on two sides by the Strymon; which city was founded by him and Mopsus. The answers of this oracle were given by dreams; the party inquiring used to pass a night in the temple, and that night's dream was the answer. Dion Callus mentions a picture done by order of Sextus Conciatus, representing the answer he received of the oracle, in the reign of the emperor Commodus.

Amphimacer, in ancient poetry, a foot consisting of three syllables, whereof the first and last are long, and that in the middle short; such is the word [Cafétis.]

Amphion, son of Jupiter and Antiope; who, according to the poets, made the rocks follow his music; and at his harp the stones of Thebes danced into walls and a regular city.

Amphipolis, in antiquity, the principal magistrates of Syracuse. They were established by Timoleon in the 100th Olympiad, after the expulsion of the tyrant Dionysus. They governed Syracuse for the space of 300 years: and Diodorus Siculus affirms us, that they subsisted in his time.

Amphipolis, a city of Macedonia, an Athenian colony, on the Strymon, but on which side is not certain; Pliny places it in Macedonia, on this side; but Scylax, in Thrace, on the other. The name of the town, Amphipolis, however, seems to reconcile their difference; because, as Thucydides observes, it was washed on two sides by the Strymon, which dividing itself into two channels, the city stood in the middle, and on the side towards the sea there was a wall built from channel to channel. Its ancient name was Enas, the Nine Ways, (Thucydides, Herodotus.) The citizens were called Amphipoleotes, (Livy.) It was afterwards called Chrismopolia; now Chrysopolis, or Chersopolis, (Holtenius.)

Amphipolis, a town of Syria, on the Euphrates, built by Seleucus, called by the Syrians Turmeda, (Stephanus): the name with Thapsacus, (Pliny); and supposed to be only renewed and adorned by Seleucus, because long famous before his time, (Xenophon.)

Amphipolis, in Grecian antiquity, soldiery who, in war, used two horses without saddles, and were dextrous enough to leap from one to the other.

Amphiprosphorer, in the naval affairs of the ancients, vellets with a prow at each end. They were used chiefly in rapid rivers and narrow channels, where it was not easy to tack about.

Amphi prostyle, in the architecture of the ancients, a temple which had four columns in the front, and as many in the side behind.

Amphisbaena, in zoology, a genus of serpents belonging...
belonging to the order of amphibia serpents, so called from the fable notion of its having two heads, because it moves with either end foremost.

The head of the amphithea is small, smooth, and blunt; the nostrils are very small; the eyes are minute and blackish; and the mouth is furnished with a great number of small teeth. The body is cylindrical, about a foot long, and divided into about 200 annular convex segments like those of a worm; and it has about 40 longitudinal stipes, of which 12 on each side are in the form of small croisses like the Roman X; the anus is a transverse slit; and the tail ring or segment of the belly has eight small papillae, forming a transverse line before the anus; the tail, i.e. all the space below the anus, is short, consisting of 30 annular segments, without being marked with the cross-lines, and is thick and blunt at the point. The colour of the whole animal is black, variegated with white; but the black prevails most on the back, and the white on the belly. It has a great resemblance to a worm, living in the earth, and moving equally well a foot and divided into about the form of small papillae, forming a transverse line before the anus; the tail, i.e. all the space below the anus, is short, consisting of 30 annular segments, without being marked with the cross-lines, and is thick and blunt at the point. The colour of the whole animal is black, variegated with white; but the black prevails most on the back, and the white on the belly. It has a great resemblance to a worm, living in the earth, and moving equally well with either end foremost. There are but two species, viz. 1. The fuliginosa, which answers exactly to the above description, and is found in Libya and in different parts of America. 2. The alba, which is totally white, is a native of both the Indies, and is generally found in ant-hills. The bite of the amphithea is reckoned to be mortal by many authors; but as it is not furnished with poison of serpents, later writers, particularly the latter. See Plate XVIII.

AMPHIBIANA Aquatic, a name given by Bertratus, Albertus, and several other authors, to that long and slender insect, called by others the seta aquatic, and vermis fistarius. It has the name amphibia, from its going backwards or forwards with equal ease and facility. The usual size is four or five inches long, and the thickness of a large hair.

Dr Lieter accidentally found out the origin of this worm, in his researches into the history of a very different sort of insect. Distinguishing one of the common black beetles dug up in a garden, he found in its belly two of these hair worms, or amphibia; and renewing the experiment on other beetles of the same species, he found that they had already swallowed one, two, or three of these worms. As soon as the body of the beetle is opened, they always crawl out. When put into water they will live a considerable time, and swim nimbly about; but often put up their heads above water, as if endeavouring to make their escape, and sometimes fastening themselves by the mouth to the sides of the vessel, and drawing their whole bodies after them. These creatures are not only found in the waters, but buried in earth, and sometimes on the leaves of trees, in gardens and hedges. Phil. Trans. No 83.

AMPHISC1, among geographers, a name applied to the people who inhabit the torrid zone. The Amphisci, as the word imports, have their shadows one part of the year towards the north, and the other towards the south, according to the sun's place in the ecliptic. They are also called Aëschi. See Aesci.

AMPHISSA, (anc. geog.), the capital of the Locri Oxoae, 120 stadia (or 15 miles) to the west of Delphi, (Pausanias.) So called, because surrounded on all hands by mountains, (Stephanus.) Hence Amphissae, the in- Amphitheatres.

Hence Amphitheatre, the in- Amphitheatres.—Also a town of Magna Graecia, at the mouth of the Sagro, on the coast of the Farther Calabria, situated between Locri and Caulonia, now called Rocellla. Amphitus the epithet, (Ovid.)

AMPHITANE, among ancient naturalists, a stone said to attract gold as the lodestone does iron. Pliny says it was found in that part of the Indies where the native gold lay so near the surface of the earth as to be turned up in small masses among the earth of ant-hills; and describes it to have been of a square figure, and of the colour and brightness of gold. The description plainly points out a well-known foil, called, by Dr Hill, prunicium: this is common in the mines of most parts of the world; but neither this nor any other stone was ever suppressed, in our times, to have the power of attracting gold.

AMPHITHEATRE, in antiquity, a spacious edifice, built either round or oval, with a number of rising seats, upon which the people used to behold the combats of gladiators, of wild beasts, and other sports.

Amphitheatres were at first only of wood; and it was not till the reign of Augustus, that Statilius Taurus built one, for the first time, of stone. The lower part was an oval figure, and called arena, because, for the convenience of the combatsants, it was usually strewed with sand; and round the arena were vaults fluted cavea, in which were confined the wild beasts appointed for the shows.

Above the cavea was erected a large circular peristyle, or podium, adorned with columns. This was the place of the emperors, senators, and other persons of distinction.

The rows of benches were above the podium. Their figure was circular; and they were entered by avenues, at the end of which were gates called vomitoria.

This theatre was built in form of a semicircle, only exceeding a juft semicircle by one fourth part of the diameter; and the amphitheatre was nothing else but a double theatre, or two theatres joined together: so that the longest diameter of the amphitheatre was to the shortest as 1 ½ to 1.

There are amphitheatres still standing at Rome, at Pola, at Nimes, &c. The amphitheatre of Vespasian, called the Colisseum, and that at Verona in Italy, are the most celebrated now remaining of all antiquity. Remains of amphitheatres are shown also at Arles, Bourdeaux, &c. The amphitheatre at Pola, an ancient republic of Istria, is very entire: it consists of two orders of Tuscan pillars, one over the other. The lower have pedestals, which is extraordinary; this order having scarce ever more than bases to support them. The amphitheatre of Vespasian is computed to have been capable of holding 87,000 spectators. That of Verona is the best preserved: for though most of the great and belted stones of the outside are picked out, yet the great vault, on which the rows of the seats are laid, is entire; the rows also (which are 44 in number) are entire. Every row is a foot and a half high, and as much in breadth; so that a man sits conveniently in them; and allowing for a seat a foot and a half, the whole will hold 23,000 persons. Pliny mentions an amphitheatre built by Curio, which turned on large iron pivots; so that of the same amphitheatre...
Amphitheatre two several theatres were occasionally made, wherein different entertainments were sometimes presented at the same time. Mr Brydone (vol. i. 295), mentions an amphitheatre at Syracuse, the theatre of which is so entire, that the gradini for seats still remain; but it is a small theatre, he says, in comparison of the others. See Plate XVI.

Amphitheatre, in gardening, certain dispositions of trees and shrubs on the sides of hilly places, which, if the hill or rising be naturally of a circular figure, always have the best effect. They are to be formed of evergreens, such as hollies, philleries, laurulines, bays, and such plants, observing to plant the shortest growing trees in the front, and those which will be the tallest behind, such as pines, firs, cedars of Lebanon, &c.

Amphitheatres are also sometimes formed of slopes on the sides of hills, covered only with turf; and when well kept, they are a great ornament to large gardens. See Plate X.

The Romans had a method of keeping wine in wells. The Romans had a method of keeping wine, by an enumeration of circumstances; so as to excite the proper emotions in the souls of the auditors. Such is the passage in Virgil, where, instead of saying merely that Turnus died, he amplifies the circumstances of his death.

—Aft illi soluntur frigores membra, Vitaque cum gemini fugit indignata sub umbras.

The masters of eloquence made amplification to be the soul of discourse. See Oratory, n. 39.

Amphora, in antiquity, a liquid measure among the Greeks and Romans. The Roman amphora contained 48 sextaries, equal to about seven gallons one pint English wine-measure; and the Grecian or Attic amphora contained one-third more.

Amphora was also a dry measure used by the Romans, and contained about three bushels.

Amphora, among the Venetians, is the largest measure used for liquids, containing about 16 quarts.

Amphorarium vinum, in antiquity, denotes that which is drawn or poured into amphora or pitchers; by way of distinction from vinum doliare, or cask wine. The Romans had a method of keeping wine in amphora for many years to ripen, by fastening the lids tight down with pitch or gypsum, and placing them either in a situation where the smoke came, or under ground.

Amphorides, in antiquity, a kind of armour or covering for the ears, worn by the ancient pugiles, to prevent their adversaries from laying hold of that part.

Amphi-rus, or Amphrysus, (anc. geog.) a river of Phthiotis, a district of Thessaly, running by the foot of mount Othrys, from south to north, into the Enipeus at Thebes of Thessaly; where Apollo fed the herds of king Admetus (Virgil, Lucan). Another Amphrysus in Phrygia, rendering women barren, according to Pliny; Hence the epithet Amphrysius (Statius). Also a town of Phocias, at the foot of mount Parnassus, encompassed with a double wall by the Thbeans in the war with Philip (Pausanias); Amphrysi Vates, in Virgil, denotes the Sibyl.

Amphthill, a town in Bedfordshire, seated pleasantly between two hills, but in a barren soil. W. Long. 0. 29. N. Lat. 52. 2.

Ampliation, in a general sense, denotes the act of enlarging or extending the compass of a thing.

On a medal of the emperor Antoninus Pius, we find the title Ampliator civium given him, on account of his having extended the jus civilis, or right of citizenship, to many states and people before excluded from that privilege. In effect, it is generally supposed to have been this prince that made the famous confutation, whereby all the subjects of the empire were made citizens of Rome.

Ampliation, in Roman antiquity, was the deferring to pass sentence in certain causes. This the judge did, by pronouncing the word amplius; or by writing the letters N. L. for non liquet; thereby signifying, that, as the cause was not clear, it would be necessary to bring further evidence.

Amplification, in rhetoric, part of a discourse or speech, wherein a crime is aggravated, a praife or commendation heightened, or a narration enlarged; or by an enumeration of circumstances; so as to excite the proper emotions in the souls of the auditors.

Amphux, in antiquity, denotes the clay at the edges is white, and the clay in the middle is red. Of the latter, the ancients imagined that this gulph led to hell. The Moffetta is a narrow valley, extending a considerable way to the south-west, and pressed thickly covered with coppices of oak. The bottom of the valley is inclined to a barren soil, the wind, and to keep clear of it, to avoid suffocation. The bottom of the ditch is bare and arid; in the lowest part, and close under one of the hills, is an oval pond of muddy yellow-coloured water, not above 50 feet in diameter; it boils up in several places with great force in irregular fits, which are always preceded by a hissing sound.

The water was several times spouted up as high as our heads in a diagonal direction, a whirlpool being formed round the tube, like a bason, to receive it as it fell. A large body of vapour is continually thrown out with a loud rumbling noise. The fumes on the rising ground that hangs over the pool are quite yellow, being stained with the fumes of sulphur and sal-ammoniac. A most nauseous smell rising with the steam obliged us to watch the wind, and to keep clear of it, to avoid suffocation.

The water is quite insipid both as to taste and smell; the clay at the edges is white, and carried into Puglia to rub upon scabby sheep, on which account the lake is famed out at 100 ducats a-year. On a hill above this lake stood formerly a temple dedicated to the goddess Mephitis; but I perceived no remains of it.

Amphulla, in antiquity, a round big-bellied vessel,
Ampulla

Ampulla, among ecclesiastical writers, denotes one of the sacred vessels used at the altars. Ampullae were also used for holding the oil used in chrismation, consecration, coronation, &c. Among the ornaments of churches we find frequent mention made of ampuls or vials. In the inventory of the cathedral of Lincoln we meet with ampuls of chrysolite, variously enriched with silver feet and covers; one containing a tooth of St Christopher, another a tooth of St Cecily, another a bone of the head of St John Baptist.

Knights of St Ampulla, belong to an order instituted by Clovis I, king of France; at the coronation they bear up the canopy, under which the ampulla is carried in procession.

Ampura, a province of the kingdom of Peru, before its conquest by the Spaniards. Here the inhabitants worshipped two lofty mountains from a principle of gratitude, because of the descent of the water from them by which their lands were fertilized. It is said to have been conquered by Virachoca, the eighth Inca.

Ampurias, the capital of the territory of Ampurdan, in Catalonia, seated at the mouth of the river Fluvia, in E. Long. 2° 56'. N. Lat. 42° 5'. The land about it is barren, full of briars and thorns; but it was recovered from the incursions of the inhabitants of Utrecth, with whom the Hollanders were often quarrelling; but some months afterwards it was almost reduced to ashes. In 1512, it was besieged by the people of Guelderland; who, not being able to take it, set fire to the ships in the harbour. In 1525, an Ambrasian leader, with 600 of his followers, got into the town-house, where at last he died. But the enemy, being pressed, attacked the town-house, and defeated those that made any resistance. At length they barricaded, with wool and hop-facks, the avenues to the market-place, where these enthusiasts were posted; and so put a stop to their fury till day appeared, so that the whole of them were cut to pieces. About ten years after, there was another tumult raised by a parcel of fanatics, consisting of men and women, who ran about the streets stark naked, and had a design of making themselves masters of the town-house. Their shrieks and cries, which were dreadful enough, soon alarmed the inhabitants, who seized the greatest part of them, and gave them the chastisement they deserved.

Amsterdam was one of the last cities that embraced the reformed religion. It was besieged by the Hollanders in 1578, and submitted after a siege of ten months. One article of the capitulation was, a free exercise of the Roman-catholic religion; but this was not observed by the Protestants; for they soon drove the ecclesiastics, monks, and nuns, out of the city, broke the images, and demolished the altars. From this time it became the general rendezvous of all nations and of every
and broad, full of rounded rum. The principal canal is formed by the dikes and lined with which cross the city in many parts, and the streets of the city, port, and sea. The port is a large square of houses Amsterdam for their beguines (a kind of nuns) to live in; who are not shut up in cloysters as other nuns in Roman-Catholic countries, but have liberty to walk abroad, and may even marry when they are tired of this kind of life. These chapels of the Roman-Catholics have no bells allowed them, being looked upon as conventicles, and may be shut up and opened according as the government pleases. The other third part of the city is made up of Jews, Lutherans, Armenians, Anabaptists, &c. none of whom, as was said of the Roman-Catholics, are allowed to have bells in their churches. Those who marry, and are not of the established religion, are obliged to be joined first by the magistrates, and then they may perform the ceremony in their own assemblies. The Jews, who are very considerate in this place, have two synagogues; one of which, namely, the Portuguese, is the largest in Europe. Within the court-yard, where their synagogue stands, they have several rooms or schools, where their children are taught Hebrew, and very carefully instructed in the Jewish religion.

The most remarkable of the religious buildings is the New Church, dedicated to St Catherine. It was begun in the year 1408, others say 1414; and was 100 years a-building. It had the misfortune of being burnt in the year 1643, but was in a short time after built in a more magnificent manner. The foundation of a steeple is laid before this church, which was designed to be very high. The plan on which it was to be erected is not above 100 feet square, and yet they are 62344 in number, and those very large. Nevertheless it was thought that these vast piles, or rather the ground, were not able to support the pro- digious weight they intended to lay upon it; for which reason the steeple remains unfinished. The pulpit is a masterpiece of the kind, wherefore the four evangelists and many other curious pieces of sculpture are reprefented. The glafs-windows are adorned with paintings, among which the emperor Maximilian is described, presenting an imperial crown to the burgomasters of Amsterdam for the creft of the arms of this city. The organ is very large, and reckoned one of the best in the world. It has a set of pipes that counterfeit a chorus of voices, and has 52 whole flops, besides half flops, with two rows of keys for the feet, and three rows of keys for the hands. Those who hear it play for the first time, imagine they hear a human voice. The grate dividing the chancel from the body of the church is all of Corinthian brafs. The branches of candleflares are the richest in the Seven Provinces. There is a very fine marble monument erected to Admiral Ruyter, who was killed at Medura.

The public buildings of a civil nature are very magnificent. The fleet-house was founded in 1628. It is built upon 14,000 wooden piles; and its front is 282 feet long, its sides 255 feet, and its height to the roof 116. There is a marble pedestal in the front, whereon a woman is carved in relievo, holding the arms of the city; she is seated in a chair, supported by two lions, with an olive branch in her right hand; on each side are four Naiads, who present her with a crown of palm and laurel, and two other marine deities present her with different forms of fruit; besides, there is Neptune with his trident, accompanied with Tritons, a sea-unii...
Amsterdam corn, and a sea-horse. On the top stand three statues in bronze, representing Justice, Strength, and Plenty. On the top of the first is a round tower, 50 feet above the roof, adorned with statues, and a harmonious chime of bells, the biggest of which weighs about 7000 pounds, and the next 6000. They are made to play different tunes every month. It has not one handsome gate, but only seven doors to answer to the number of the United Provinces. On the floor of the great hall are two globes, the celestial and terrestrial, which are made of white and black marble, and are inlaid with Jasper and copper. In general all the chambers are enriched with paintings, carvings, and gildings. While this fladt-houfe was building, the old zens, wherein the keys of the city are locked every night. At the end of the great hall is the schepens or aldermen's chamber, where civil caufes are tried. Besides these, there are the chambers of the senate and council, the burgomasters chamber, the chambers of accounts, &c. The in the second floor is a large magazine of arms; and on the top of the building are six large cisterns of water, which may be conveyed to any room in the house in cafe of fire; to prevent which the chimneys are lined with copper.

The bourfe, or exchange, where the merchants assemble, is all of free-stone, and built upon 2000 wooden piles. Its length is about 250 feet and its breadth 140. The galleries are supported by 26 marble columns, upon each of which are the names of the people that are to meet there. They are all numbered; and there is a place affixed for every merchant under these numbers. On the right hand of the gate is a superb flair-cafe which leads to the galleries; on one side of which there are several shops, and on the other a place to sell clothes. It is not unlike the royal exchange in London.

The admiralty-office, is in a house which belonged formerly to the princes of Orange. The arsenal for their men of war is in the harbour. This is a very handsome building, 200 feet long and 22 broad. The ground floor is filled with bullets; the second floor contains the arms and ordnance; the third their falls, pulleys, flags, &c. This arsenal contains a great many curiosities; among the ref; an Indian canoe brought from the straits of Davies, and a conservatory of water on the top of the house that holds 1600 tons of water, which may be distributed in cafe of fire into 16 different parts by leaden pipes. Hard by this edifice you see the dock or yard where they build their men of war. This dock is 588 feet long, and contiguous to it are houses for lodging the ship-carpenters. The dock is plentifully supplied with every thing necessary for the construction of ships.

The East-India company occupy a large building divided into several offices or apartments. In some Amsterdams of those they have great stores of packed goods, and likewise a room with all sorts of drugs, tea, wax, ambergris, and mace. Here they have a magazine full of medicaments for surgeons chefs, to furnish the company's ships and garrisons in the Indies; as also large magazines of nutmegs, cloves, mace, and cinnamon. In the court-yard there is a guard-chamber, where every night the house-keeper has a watch; and on the other side of the gate, there is a chemist, who with his men prepares medicines for the Indies; and adjoining to this court-yard is their warehouse and powder house for pepper and gros goods. In the new part of the city they have a magazine or palace, which may properly be called an arsenal. The ground on which the building stands is 2000 feet, and square every way, reckoning the moats or burgwall about it. The two rope-alleys are 1800 feet long, on the backside of which is a flore of 500 large anchors besides small ones. In this arsenal they build the ships belonging to the India chamber of Amsterdam; for which reason they have all forts of workhouses here for the artificers that serve the company.

The academy, called the Illustrious School, is likewise a very fine building. It was formerly a convent belonging to the nuns of St Agnes. Here they teach Latin, the oriental languages, theology, philosophy, history, &c. The lawyers and physicians have likewise their schools.

Besides these, there are several hospitails, or houses for orphans, for poor widows, for fick persons, and for mad people; all which are regulated with much prudence. The Rasphoufe, which was formerly a nunnery, is now a fort of a work-house for men that behave ill. They are commonly fed at jaw or rasph Brafal wood; and if they will not perform their task, they are put into a cell which the water runs into, where if they do not almost constantly ply the pump, they run the risk of being drowned. There is likewise a spin-house for debauched women, where they are obliged to spin wool, flax, and hemp, and do other work. All the hospitails are extremely neat, and richly adorned with pictures. They are maintained partly by voluntary contributions, which are raised by putting money into the poor's boxes fixed up all over the city; and partly by taxing all public diversions, as well as fairs, &c. Likewise every person that passes through any of the gates at candle-light pays a penny for the fame uses. These charities are taken care of by certain officers called deacons. The governors are nominated by the magistrates out of the most considerable men in the city.

The common fort have places of diversion called Spill-houfe, where there are music and dancing. They are much of the fame kind as the hops which were so frequent about London. If strangers go there, they must take care not to make their address to a woman that is engaged to any other man.

There are two suburbs to this city; one at the gate of the regulars; and the other goes as far as Overtoon, a village a little way from Amsterdam, where boats which come from Leyden are rolled over land upon wooden rollers. There is likewise in this city an hospital for those that are infected with the plague; which was built in the year 1630, and has 360 windows.
The city is governed by a senate or council, which consists of 56 persons called a Vroedhuis, who enjoy their places for life; and when any of them dies, the remainder choose another in his stead. This senate elects deputies to be sent to the States of Holland, and appoints the chief magistrates of the city, called Burgomasters or Exchequers, who are like our aldermen. The number is twelve; out of which four are chosen every year to execute the office, and are called Burgomaster-regent. Three of those are discharged every year, to make room for three others. One of the four is kept in to inform the new ones of the state of affairs, and also presides the three first months in the year, and the others, three months each; so that, when they are in this office, they may be compared to the lord-mayor of the city of London. These alterations and appointments are made by their own body. They dispose of all inferior offices which become vacant during their regency. They have likewise the direction of all public works, which regard the safety, tranquillity, and embellishment of the city. The keys of the famous bank of this city are in the hands of these magistrates.

The college consists of new burgomasters or exchequers, who are judges in all criminal affairs, without appeal; but in civil causes they may appeal to the council of the province. There are two treasurers, a bailiff, and a penionary. The bailiff continues in his office three years; and searches after criminals, takes care to secure them, and sees their sentence executed. The penionary is the minister of the magistracy, is well versed in the laws, makes public harangues, and is the defender of the interests of the city. The city of Amsterdam contributes to the public income above 50,000 livres per day, besides the excise of beer, flesh, and corn; which, in all, amounts to above 1,600,000 a-year. This is more than is paid by all the rest of the provinces put together; and yet Amsterdam bears the fifth rank in the assembly of the States of Holland, with this distinction, that whereas other cities in two years, this lends four.

The mint of Amsterdam is of considerable. They have 60 companies, each of which has from 200 to 300 men. Jews and Anabaptists are excluded from this service, not being admitted to bear arms; but they are obliged to contribute to the maintenance of the city-guard, which consists of 1400 soldiers; as also to the night-watch, who patrol about the streets and proclaim the hour. Besides these, there are trumpeters on every church steeple, who found every half hour; and if there happens a fire, they ring the fire-bell, and show where it is. The inhabitants have excellent contrivances to extinguish it speedily.

The trade of Amsterdam is prodigious: for almost the whole trade of the East India company centres in this city, which besides carries on a commerce with all the rest of the world, innumerable that it may be called the magazine or store-house of Europe. They import a vast deal of corn from the Baltic, so not much for present consumption, as to lay up against times of scarcity. The richest spices are entirely in the hands of the East India company, who furnish all Europe therewith. They have vast quantities of military stores, with which they supply several nations; which is owing to their engrossing most of the iron-works on the Rhine and other great rivers that run into Holland.

The longitude of Amsterdam is 4. 30. E.; the latitude, 52. 25. N.

Amsterdam, is also the name of an island in the south-sea, said to have been discovered by Tafman, a Dutch navigator. It was visited by Captain Cook in his late voyages. Its greatest extent from east to west is about 21 miles, and from north to south about 13. It is broad at the east end, and runs taper towards the west, where it turns, and runs to a point due north. It is about six leagues to the west of Middleburgh. The shore is surrounded by a coral rock, and its most elevated parts are not above six or eight yards above the level of the sea. S. Lat. 27. 11. W. Long. 175. It is wholly laid out in plantations, in which are cultivated some of the richest productions of nature.

Here are bread-fruit, cocoa-nut trees, plantains, bananas, shaddock, yams, and some other roots, sugar-canes, and a fruit like a nectarine, called by the natives fighega. There did not appear an inch of waste ground: the roads occupied no more space than was absolutely necessary: the fences did not take up above four inches each; and even these were not wholly loft, for in many grew some useful trees or plants: it was everywhere where the fame, change of place altered not the scene; nature, affilit by a little art, no where appeared with more splendour than on this island. Water is not so plentiful here as at the Society-islands; but the chief pointed out a pool of fresh water unfixed, to supply the ships with that necessary article. Cautuns, pandangs, and wild fago-palms, appear here with their various tints of green, and barringtonia as big as the loftiest oaks. The bread-fruit does not, however, thrive here with the same luxuriance as at the Society-islands; the coral rock, which composes the basis of this spot, being much more thinly covered with mould.

Both men and women are of the common size of Europeans, and their colour is that of a lightish copper; they are well-shaped, have regular features, are active, brisk, and lively. They have fine eyes, and in general good teeth, even to an advanced age. The women are the merriest creatures imaginable, and incessant talkers. In general, they appear to have the beards quite close, although there was no want of those of a different stamp. Among the natives, who swam about the ship very vociferously, were a considerable number of women, who wantoned in the water like amphibious creatures, and were easily perfuaded to come on board perfectly naked; but none of them ventured to stay there after funset, but returned to the shore to pass the night, like the greater part of the inhabitants, under the shade of the wild wood which lined the coast. There they lighted great fires, and were heard conversing almost the whole night. The hair of both sexes in general is black, but especially that of the women; both sexes wear it short, except a single lock on the top of the head, and a small quantity on each side. The men cut or shave their beards quite close, which operation they perform with two files. The hair of many was observed to be burnt at the ends, and burned with a white powder, which was found, on examining it, to be lime made of shell or coral, which had corroded or burnt the hair; some made use of a blue powder, and others, both men and women, of an orange-coloured powder made of turmeric.

The drefs of both sexes consists of a piece of cloth or
Amulet. or matting wrapped round the waist, and hanging down below the knees. From the waist upwards they are generally naked, and it seems to be a custom to anoint these parts every morning. The practice of tattooing, or puncturing the skin, likewise prevails. The men are tattooed from the middle of the thigh to above the hips: the women have it only on their arms and fingers, and on those parts but very slightly. Their ornaments are amulets, necklaces, and bracelets, the bone, shells, and beads of mother-of-pearl, tortoise-shell, &c. which are worn by men as well as women. The women also wear on their fingers neat rings made of tortoise-shell, and pieces in their ears about the size of a small quill; but here ornaments are not commonly worn, though all have their ears pierced. They have also a curious apron, made of the cocoanut shell, and composed of a number of small pieces sewed together in such a manner as to form stars, half-moons, little squares, &c.; it is studded with beads and shells, and covered with red feathers, so as to have a pleasing effect. They make the same kind of cloth, and of the same materials, as an O-Tahitian, though they have not such a variety, nor do they make any fine; but, as they have a method of glazing it, it is more durable, and will retain paint for some time, which the other cloth would not. Their colours are black, brown, yellow, purple, and red; all made from vegetables. They make various sorts of matting, some of a very fine texture, which is generally used for clothing; and the thick and stronger sort serves to sleep upon, and to make sails for their canoes, &c. Among other useful utensils, they have various sorts of baskets, some made of the same materials as the mats, and others of the twisted fibres of cocoanuts. These are not only durable, but beautiful, being generally composed of different colours, and studded with beads made of shells or bones. They have many little nicknacks among them, which show that they neither want taste to design, nor skill to execute, whatever they take in hand. Their fishing implements are much the same as in other islands: here was purchased a fish-net made like our casting-nets, knit of very firm though slender threads.

Notwithstanding their very friendly disposition, these people have very formidable weapons; some of their spears have many bars, and must be very dangerous when they take effect. A large flat shell or breast-plate was purchased, made of a round rib bone, white and polished like ivory, about 18 inches in diameter, which appeared to have belonged to an animal of the whale tribe. AMULET, a charm, or preservative against mischief, witchcraft, or diseases. Amulets were made of stone, metals, simples, animals, and in a word, of everything that imagination suggested.

Sometimes they confided of words, characters, and sentences, ranged in a particular order, and engraved upon wood, &c. and worn about the neck, or some other part of the body. See ABRACADABRA.

At other times they were neither written nor engraved; but prepared with many superfluous ceremonies, great regard being usually paid to the influence of the stars. The Arabian have given to this species of amulet the name of TALISMAN.

All nations have been fond of amulets; the Jews were extremely superstitious in the use of them, to drive away diseases; and the Minaforbids them, unless received from an approved man who had cured at least three persons before by the same means.

Among the Christians of the early times, amulets were made of the wood of the crosses, or ribbands with a text or scripture written in them, as preservatives against diseases. Notwithstanding the progress of learning and refinement, there is not any country in Europe, even at this day, who do not believe in some charms or other. The pope is supposed to have the virtue of making amulets, which he executes in the conferration of Agnus Deis, &c. The sponge which has washed his table, was formerly in great veneration as a preservative from wounds, and from death itself: on this account it was sent with great solemnity by Gregory II. to the duke of Aquitain.

Amulets are now much fallen from the repute they were anciently in: yet the great Mr Boyle alleges them as an instance of the increase of external effuvia into the habit, in order to show the great porosity of the human body. He adds, that he is persuaded some of these external medicines do answer; for that he himself, having once been subject to bleed at the nose, and reduced to use several remedies to check it, found the mofs of a dead man's skull, though only applied so as to touch the skin till the mofs was warm thereby, the most effectual of any. The same Mr Boyle shows how the effuvia, even of cold amulets, may, in tract of time, pervade the pores of a living animal; by supposing an agreement between the pores of the skin and the figure of the corpuscles. Beltini has demonstrated the possibility of the thing in his last propositions De Febribus; and the like is done by Dr Wainright, Dr Keill, &c.

AMURAT, or AMURATH, I. the fourth emperor of the Turks, and one of the greatest princes of the Ottoman empire, succeeded Solyman in 1360. He took from the Greeks, Gallipoli, Thrace, and Adrianople, which last he chose for the place of his residence. He defeated the prince of Bulgaria, conquered Miinua, chastified his rebellious bailiffs, and is said to have gained 36 battles. This prince, in order to form a body of devoted troops that might serve as the immediate guards of his person and dignity, appointed his officers to seize annually, as the imperial property, the fifth part of the Christian youth taken in war. These, after being instructed in the Mahometan religion, inured to obedience by severe discipline, and trained to warlike exercises, were formed into a body distinguished by the name of Janissaries, or New Soldiers. Every sentiment which enthusiasm can inspire, every mark of distinction that the favour of the prince could confer, were employed in order to animate this body with martial ardour, and with a consciousness of its own pre-eminence. The Janissaries soon became the chief strength and pride of the Ottoman armies, and were distinguished above all the troops whose duty it was to attend on the person of the Sultan.—At length the death of Lazarus, deipor of Servia, who had endeavoured in vain to stop the progress of Amurath's arms, touched Milo, one of his fervants, in so terrible a manner, that, in revenge, he flayed the sultan in the midst of his troops, and killed him upon the spot.
AMY

Amycle, spb, A. D. 1369, after he had reigned 23 Amygdalus years.

Amurat II. the 10th emperor of the Turks, was the eldest son of Mahomet I., and succeeded his father in 1421. He besieged Constantinople and Belgrade without success; but he took Thebaldonica from the Venetians, and compelled the prince of Bosnia and John Castrio prince of Albany to pay him tribute. He obliged the latter to send his three sons as hostages; among whom was George, celebrated by the name of Scanderbeg. John Huniades defeated Amurat's troops, and obliged him to make peace with the Christian princes, in 1442. These princes afterwards breaking the peace, Amurat defeated them in the famous battle of Varna, November 10th, 1444, which proved fatal to the Christians, and in which Ladillas king of Hungary was killed. He afterwards defeated Huniades, and killed above 20,000 of his men; but George Castrio, better known by the name of Scanderbeg, being re-established in the estates of his father, defeated the Turks several times, and obliged Amurat to raise the siege of Croia, the capital of Albania. Amurat died, chagrined with his ill success, and in his age, February 11th, 1453, at Adrianople. It is observed to this prince's honour, that he always kept his treaties with the Christians, and killed above those who never yet saw it, may easily conceive what a noble appearance this tree must make, when covered all over with a bloom of a delicate red, which will be in March; a time when very few trees are ornamented either with leaves or flowers. No ornamental plantation, therefore, of what sort or kind ever, should be without almond trees. Neither are the beauties of the flowers the only thing desirable in this tree: The fruit would render it worthy of planting, were there no other motive. It ripens well, and its goodness is well known. The white-flowering almond is a variety of this species, and is cultivated for the sake of the flowers and the fruit, though the flowers are inferior to the others.

1. The Communs, or Common Almond, a native of Africa, will grow to near 20 feet high; and whether planted singly in an open place, or mixed with others in clumps, shrubbery-quarters, &c. shows itself one of the finest flowering trees in nature. Those who have never seen it, may easily conceive what a noble appearance this tree must make, when covered all over with a bloom of a delicate red, which will be in March; a time when very few trees are ornamented either with leaves or flowers. No ornamental plantation, therefore, of what sort or kind ever, should be without almond trees. Neither are the beauties of the flowers the only thing desirable in this tree: The fruit would render it worthy of planting, were there no other motive. It ripens well, and its goodness is well known. The white-flowering almond is a variety of this species, and is cultivated for the sake of the flowers and the fruit, though the flowers are inferior to the others.

2. The Nana, Dwarf Almond, is a native of Africa. Of this shrub there are two sorts, the single and the double. Both grow to about four or five feet high, and are in the first and second flowering. The single sort has its beauty, but the double kind is matchless. In both, the flowers are arranged the whole length of the last year's shoots; their colour is a delicate red; and they show themselves early in the spring, which still enhances their value.

3. The Persica, or Peach, is said to be a native of Europe, but of what place is not known. Cultivation has produced many varieties of this fruit, of which the following are the most esteemed.

1. The White Nutmeg 15. The Bellegarde
2. The Red Nutmeg 16. The Bourdine
3. The Early Purple 17. The Rosliana
4. The Small Mignon 18. The Admirable
5. The White Magdalen 19. The Old Newington
6. The Yellow Alberge 20. The Royal
7. The Large French 21. The Rambouiller
8. The Beautiful Chevaune 22. The Portugal
9. The Red Magdalen 23. The Late Admirable
10. The Chancellor 24. The Nivette
12. The Montauban 26. The Late Purple
13. The Malta 27. The Perigie
14. The Vineuze 28. The Catharine

The White Nutmeg is the first peach in season, it being often in perfection by the end of July. The leaves are doubled ferrated, the flower large, and of a pale colour; the fruit is white, small, and round; the
Amygdalus the flesh, too, is white, parts from the stone, and has a fugary, musky flavour.

The Red Nutmeg hath yellowish green leaves, with serpentine edges, which are slightly ferrated. The flowers are large, open, and of a deep bluish colour. The fruit is larger and rounder than the former, and is of a bright vermillion next the fun, but more yellow on the other side. The flesh is white, parts from the stone, from which it separates, and has a rich musky flavour. It ripens just after the white nutmeg.

The Early Purple hath smooth leaves, terminated in a sharp point. The flowers are large, open, and of a lively red. The fruit is large, round, and covered with a fine deep red coloured down. The flesh is white, red next the stone, and full of a rich vinous juice. Ripe about the middle of August.

The small Mignon hath leaves slightly ferrated, and the flowers small and contracted. The peach is round, of a middling size, tinged with darkish red on the fun-side, and is of a pale yellowish colour on the other. The flesh is white, parts from the stone, where it is red, and contains plenty of a vinous fugary juice. Ripens rather before the former.

The White Magdalen hath long, shining, pale-green leaves, deeply ferrated on the edges, and the wood is most black at the pith. The flowers are large and open, appear early, and are of a pale red. The fruit is round, rather large, of a yellowish-white colour, except on the funny side, where it is slightly streaked with red. The flesh is white to the stone, from which it separates, and the juice is pretty well flavoured. Ripe at the end of August.

The Yellow Alberge hath deep red, middle-sized flowers; the peach is smaller than the former, of a yellow colour on the shady side, and of a deep red on the other. The flesh is yellow, red at the stone, and the juice is fugary and vinous.

The great French Mignon hath large, finely ferrated leaves, and beautiful red flowers. The fruit is large, quite round, covered with a fine fatty down, of a brownish red colour on the funny side, and of a greenish yellow on the other. The flesh is white, easily parts from the skin, and is copiously flored with a fugary high-flavoured juice. Ripe near the middle of August.

The beautiful Chevreufe hath plain leaves, and small contracted flowers. The fruit is rather oblong, of a middling size, of a fine red colour next the fun, but yellow on the other side. The flesh is yellowish, parts from the stone, and is full of a rich fugary juice. It ripens a little after the former.

The Red Magdalen hath deeply ferrated leaves, and large open flowers. The fruit is large, round, and of a fine red next the fun. The flesh is firm, white, parts from the stone, where it is very red; the juice is fugary, and of an exquisite rich flavour. Ripe at the end of August.

The Chancellor hath large, slightly ferrated leaves. The peach is about the size of the Beautiful Chevreufe, but rather rounder. The skin is very thin, of a fine red on the funny side; the flesh is white and melting, parts from the stone, and the juice is very rich and fugary. It ripens with the former.

The leaves of Smith’s Newington are ferrated, and the flowers are large and open. The fruit is of a middle size, of a fine red on the sunny side; the flesh white and firm, but very red at the stone, to which it sticks closely, and the juice has a pretty good flavour. Ripens with the former.

The Montauban hath ferrated leaves, and large open flowers. The fruit is about the size of the former; of a purplish red, but of a pale one on the shady side. The flesh is melting, white, except to the stone, from which it separates. The juice is rich, and well flavoured. It ripens a little before the former.

The Malta hath deeply ferrated leaves, and the flowers are large and open. The fruit is almost round, of a fine red next the fun, marbled with a deeper red, but the shady side is of a deep green. The flesh is fine, white, except at the stone, from which it parts, where it is of a deep red; the juice is a little musky, and agreeable. It ripens at the end of August, or beginning of September.

The Vineufa hath large deep green leaves, and full bright red flowers. The fruit is round, of a middle size; the skin is thin, of a fine red; the flesh is white, except at the stone, where it is very red, and the juice is copious and vinous. Ripe in the middle of September.

The Bellegarde hath smooth leaves, and small contracted flowers. The fruit is very large, round, and of a deep purple colour next the fun. The flesh is white, parts from the stone, where it is of a deep red, and the juice is rich and excellent. It ripens early in September.

The Bordine hath large, fine green, plain leaves, and small flesh-coloured contracted flowers. The fruit is round, of a dark red next the fun; the flesh is white, except at the stone, where it is of a deep red, and the juice is rich and vinous. Ripens with the former.

The Rossana hath plain leaves, and small contracted flowers. The fruit is rather longer than the al­berge, and some count it only a variety of the latter. The flesh is yellow, and parts from the stone, where it is red; the juice is rich and vinous. Ripe early in September.

The Admirable hath plain leaves, and small contracted flowers, which are of a pale red. The fruit is very large and round; the flesh is firm, melting, and white, parts from the stone, and is there red; and the juice has a sweet, fugary, high vinous flavour. Ripe early in September.

The Old Newington hath ferrated leaves, and large open flowers. The fruit is large, of a fine red next the fun; the flesh is white, sticks close to the stone, where it is of a deep red, and the juice has an excellent flavour. It ripens just after the former.

The Royal hath plain leaves, and small contracted flowers. The fruit is about the size of the admirable, and resembles it, except that it has sometimes a few knobs or warts. The flesh is white, melting, and full of a rich juice; it parts from the stone, and is there of a deep red. Ripe about the middle of September.

The Rambouillet hath leaves and flowers like the royal. The fruit is rather round than long, of a middling size, and deeply divided by a furrow, and is of a bright yellow on the shadie side, but of a fine red on the other. The flesh is melting, yellow, parts from the
The Portuguese have plain leaves, and large open flowers. The fruit is large, spotted, and of a beautiful red on the funny side. The flesh is firm, white, sticks to the stone, and is there red. The stone is small, deeply furrowed, and the juice is rich and sugary. Ripen towards the end of September.

The late Admirable hath serrated leaves, and brownish red small contracted flowers. The fruit is rather large and round, of a bright red next the fun, marbled with a deeper. The flesh is of a greenish-white, and sticks to the stone, where it hath several red veins; the juice is rich and vinous. Ripen about the middle of September.

The Nivette hath serrated leaves, and small contracted flowers. The fruit is large and roundish, of a bright red colour next the fun, but of a pale yellow on the shady side. The flesh is of a greenish yellow, parts from the stone, where it is very red, and is copiously flowed with a rich juice. It ripens about the middle of September.

The Nipple hath finely serrated leaves, and rosy-coloured, small contracted flowers, edged with carmine. The fruit is of a middling size, and has a rind like a breast. It is of a faint red on the funny side, and on the shady one of a straw-colour. The flesh is melting, white, separates from the stone, where it is red, and the juice is rich and sugary. Ripens late in September.

The Late Purple hath large, serrated leaves, which are variously contorted, and the flowers are small and contracted. The fruit is round, large, of a dark red on the funny side, and yellowish on the other. The flesh is melting, white, parts from the stone, where it is red, and the juice is sweet and high-flavoured. Ripens with the former.

The Persique hath large, very long indented leaves, and small contracted flowers. The fruit is large, oblong, of a fine red next the fun; the flesh firm, white, but red at the stone, juicy, and of a high pleasant flavour. The stalk has frequently a small knot upon it. Ripen late in September.

The Catarrine hath plain leaves, and small flowers. The fruit is large, round, of a very dark red next the fun. The flesh white, firm, sticks close to the stone, and is there of a deep red. The stone is rich and pleasant. It ripens early in October.

The Monfrous Pavy hath large, very slightly serrated leaves, and large, but rather contracted flowers. The fruit is round, and very large, whence its name. It is of a fine red on the funny side, and of a greenish-white on the other. The flesh is white, melting, sticks close to the stone, and is there of a deep red. It is pretty full of juice, which in dry seasons is sugary, vinous, and agreeable. Ripen towards the end of October.

The Bloody Peach hath rather large, serrated leaves, which turn red in autumn. The fruit is of a middling size, the skin all over of a dull red, and the flesh is red down to the stone. The fruit is but dry, and the juice rather dry and bitterish. It is well worth cultivating notwithstanding, for the fruit bake and preserve extremely well.

The peach-tree has hitherto been planted against walls for the sake of the fruit: "but, (says Hanbury), Amygdalus as I hardly ever knew a person who was not struck with the beauty of the flowers when in full blow against a wall, why should it not have a share in wilderens quarters, and shruberies, amongst the forst of almonds, &c.? It may be kept down, or permitted to grow to the height of the owner's fancy: and if the flowers are the same as on the other sorts. Add to this, they frequently, in well-sheltered places, produce fruit which will be exceeding well-flavoured; and thus the owner may enjoy the benefit of a double treat." The above observations respect the single peach; with regard to the double-flowered, it is generally propagated for ornamental plantations, and is universally acknowledged to be one of the finest flowering-trees yet known. Against a wall, however, these trees are always the fairest; and if they have this advantage, they are succeeded by very good fruit.

The Nectarine, according to Linnaeus, is only a variety of the peach, having a smooth coat being only an accident originally. Of this it may be observed, that the fruit is pretty large, of a yellowish red on the funny side, but of a bright yellow on the other. The flesh sticks to the stone, is there of a deep red colour, and the juice has an excellent rich flavour. Ripen towards the end of August.

The Scarlet is rather less than the former, of a fine scarlet colour next the fun, but fades to a pale red on the shady side. It ripens near the time of the former.

The Roman, or clutter red nectarine, hath plain leaves, and large flowers. The fruit is large, of a deep red towards the fun, but yellowish on the shady side. The flesh parts from the stone, and has a soft, melting, good flavoured juice. Ripen early in August.

The Newington hath serrated leaves, and large open flowers. The fruit is pretty large, of a buffet red on the funny side, but of a bright yellow on the other. The flesh sticks to the stone, is there of a deep red colour, and the juice has an excellent rich flavour. Ripen towards the end of August.

The Murrey is of a middling size, and when ripe, has a rich flavour, and ripens in September.

The Italian Nectarine hath smooth leaves and small flowers; the fruit is red next the fun, but yellowish on the other side; flesh firm, adheres to the stone, where it is red, and when ripe, which is early in September, has an excellent flavour.

The Golden Nectarine has an agreeable red colour next the fun, bright yellow on the opposite side; flesh very yellow, sticks to the stone, where it is a pale red, has a rich flavour, and ripens in September.

The Temple's Nectarine is of a middling size, of a fair red next the fun, of a yellowish green on the other side; flesh white near the stone, from which it separates.
Propagation, &c. All the above species are propagated by inoculating them into plum-fowls in August. The flocks should be first planted in the nurseries when of the size of a straw; and the first or second summer after they will be ready to receive the bud. The usual method of inoculation must be observed, and there is no danger of success; though it may be proper to ob-serve, that the double-blossomed peach should always be worked into the flocks of the mufcot-plum. The two sorts of dwarf-almond may also be propagated by layers, or from the suckers, which they sometimes send forth in great plenty.

The varieties of the peach are produced like those of the finer flowers, by fowing the seeds; and though many raised this way will be of little value; if properly planted on a bed of light dry earth, planting them three feet asunder, and one foot in the soil, and then the fowls should be immediately planted on a bed of light dry earth, planting them about three inches deep in the earth, and at about four inches asunder. The beds should be covered in pails with plumes of the belliah kind as high as they shall drop; and the wounds will then have time to heal before the severe frosts come on. In prunis of these trees it must always be observed, that it is best done under a wood bud, not a blossom bud; which may be distinguished by the wood bud's being less turgid, and longer and narrower than the blossom bud; for if the shoot have not a leading bud where it is cut, it will commonly die down to the leading bud. In nailing the shoots to the wall, they should be placed at such equal distances as possible; and so far apart that the leaves may have room; and they must always be trained as horizontally as possible, that the lower part of the tree may be well wooded, which will not be if the branches are suffered to run upright. When the fruit is set and grown to the size of a small nut, it should be thinned, and left five or six inches asunder: by this management the fruit will be larger and better tailed, and the trees in a condition to bear well the succeeding year. The quantity of fruit to be left on large full grown trees should never be greater than five dozen upon each; but on middling trees, three or four dozen will be enough. If the season should prove hot and dry, it will be proper to draw up the earth round the stems of each tree, to form a hollow basin of about six feet in diameter, and cover the surface of the ground in this basin with mulch; and once in a week or fortnight, according to the drought of the season, to pour down eight or ten gallons of water to the root of each tree; or the water may be sprinkled by an engine over the branches of the trees, which, shaking down to the roots, will promote the growth of the fruit and prevent it falling off the trees. This, however, should be continued only while the fruit is growing.

The peach-tree, as well as the rose-tree, are very subject to be over-run with the aphides; which may be destroyed by fumigating the house in which the plants are kept with tobacco; or, which is said to be the most effectual method, by steam raised from water poured over the fuses. Soap-suds are said to destroy effectively the different species of insects that infest fruit-trees growing against walls, and particularly the peach, cherry, and plum. For this purpose, a person on a ladder, should pour them from a watering-pot over both trees and wall, beginning at the top of the wall, and bringing it on in courses from top to bottom. The suds contribute likewise, it is said, to preserve the wood of the delicate and tender kinds of peaches.

Uses. Sweet almonds are reckoned to afford little nourishment; and, when eaten in fulbstance, are not easy of digestion, unless thoroughly comminuted: Peeled, and eaten six or eight at a time, they sometimes give present relief in the heart-burn. But in medicine they are mostly used for making emulsions; and they abound not only with an oil, but likewise with a mucilage fit for incorporating oil and water together. Emulsions are commonly prepared from almonds, by beating an ounce of them, after being blanched, into a fine pulp, in a marble or stone mortar; and triturating them well with half an ounce (more or less) of fine sugar; and then adding by little at a time, a quart of water; taking care to continue grinding them while the water is poured on; after which the white milky liquor is strained through a cloth, and put into a quart bottle. Some people add a drachm of blanched bitter almonds to an ounce of the sweet, which they think make the emulsions more agreeable. Such emulsions have been much used as drink in acute diseases, for diluting and blunting acrimonious juices in the first passages, and acid saline particles in the blood; and for softening and lubricating the fibres and membranes.

It has been a common practice to dissemble from half an ounce to an ounce, or more, of gum-arabic in the water
Amyntor

Amyntor, plied
of abating heat, quenching
the belly. He
more efficacious,
others,
ordered to be rubbed with them, and made up into
pills or boluses, with the addition of some conserve
or gum-arabic mucilage; or they are incorperated
with watery liquors into the form of an emulsion.
Formerly the seeds of the lettuce, of the cucumber,
of the white poppy, and of a number of other plants,
employed for making emulsions; but now the sweet almonds compose the place of the rest.
The bitter almonds are not so much used as they
were formerly; because they have been found to de-
stroy some sorts of animals: this effect was related by
the ancients, but believed to be fictitious; because
when eaten by men they appear to be innocent, and
to produce no deleterious effects. The facts related by Wepfer in his Treatise de Cucuta Aquatica,
having been confirmed by latter experiments; and it
having been discovered that a water drawn from them
had deleterious effects, and that the distilled water
from the lauro-cerasus leaves, which have a bitter
taste resembling that of bitter almonds, was still more
poisonous; it raised a suspicion of the wholomefulness
of those bitter substances, and has made physicians more
cautious of using them, though they have been em-
ployed for making orgeate and other liquors, without
producing any bad effects.

As to the peach and nectarine, they are sufficiently
known as delicious fruits. Peach-flowers have an
agreeable smell, and a bittersh taste: distilled, with-
out any addition, by the heat of a water-bath, they
yield one-sixth their weight, or more, of a whitish li-
quor, which, as Mr Bolloc observes, communicates
to a large quantity of other liquids a flavour like that
of the kernels of fruits. An infusion in water of half
an ounce of the fresh gathered flowers, or a dram of
them when dried, sweetened with sugar, proves for
children an useful laxative and anthelmimtic: the
leaves of the tree are, with this intention, somewhat
more efficacious, though less agreeable. The fruit
has the same quality with the other sweet fruits, that
of abating heat, quenching thirst, and gently loofen-
ing the belly.

Amylaceous, from amylum "flarch;" a term
applied to the fine flour of farinaceous seeds, in which
confists their nutritive part. See Bread.

Amynta, in literary history, a beautiful pastoral
comedy, composed by Tasso; the model of all dramatic
pieces wherein shepherds are actors. The Pastor Fido,
and Filii di Scirr, are only copies of this excel-
ent piece.

Amyntor, amyntor, formed of the verb amynt, I
defend, or avenger, properly denotes a person who de-
defends or vindicates a cause. In this sense, Mr Toland
intitles his defence of Milton’s life, Amyntor, as being
a vindication of that work against Mr Blackhall and
others, who had charged him with questioning the au-

Amyot

Amyot, bishop of Auxerre and great al-
moner of France, was born of an obscure family at
Melun, the 30th of October 1514, and studied philo-


This doctrine principally consists of the following
particulars, viz. that God desers the happiest of all
men, and none are excluded by a divine decree; that
none can obtain salvation without faith in Christ; that
God refuses to none the power of believing, though
he does not grant to all his assistance, that they may
improve this power to saving purpofes; and that many
perish through their own fault. Those who embraced
this doctrine were called Univerfalifts; though it is evi-
dent they rendered grace universal in words, but par-
tial in reality, and are chargeable with greater incon-
teities than the Supraalpajrianists.

Amyrauld (Moses), an eminent French
Protestant divine, born at Bourgou in Touraine in 1596.
He studied at Saumur, where he was chosen professor
of theology; and his learned works gained him the
effem of Catholics as well as Protestants, particularly
of Cardinal Richelieu, who consulted him on a plan of re-
uniting their churches, which, however, as may
well be supposed, came to nothing. He published a
piece in which he attempted to explain the mystery of
predestination and grace, which occasioned a contro-
versy between him and some other divines. He
also wrote, An Apology for the Protestants; a Para-
phrase on the New Testament; and several other
books. This eminent divine died in 1664.

Amyris: A genus of the monogynia order, belong-
ing to the decandria clafs of plants. The characters
are: The calyx is a small single-leaved perianthium,
Amyris.  The corolla consists of four oblong petals, concave and expanding: The flamina consists of eight erect fimbriated filaments: the antherae are oblong, erect, and the length of the corolla: The pistillum has an ovate germen, above, a thickish filius, the length of the flamina; and a four-cornered stigma: The pericarpium is a round drupaceous berry: The seed is a globular glossy nut. — The most remarkable species are 1. The eleutheria, or tree which bears the gum-elemi, a native of South-America. It grows to the height of about six feet, producing trifoliated stiff shining leaves, growing opposite to one another on footstalks two inches long. At the ends of the branches grow four or five slender flanks set with many very small white flowers. 2. The giliadenis, or opobalsamum, is an evergreen shrub, growing spontaneously in Arabia-Felix, from whence the opobalsam, or balm of gilead, is procured. 3. Toxiferâ, or poison-wood, is a small tree, with a smooth light-coloured bark. Its leaves are winged: the middle rib is seven or eight inches long, with pairs of pinnae one against another on inch-long footstalks. The fruit hangs in bunches, is apple-shaped, and covered by an oblong hard stone. From the bark of this tree diffuses a liquid as black as ink. Birds feed on the fruit: particularly one, called the purple greja-book, on the mucilage that covers the stone. It grows usually on rocks, in Providence, lathery, and others of the Bahama islands. 4. The balsamifera, or rose-wood, is found on gravelly hills in Jamaica and others of the West India islands. It rises to a considerable height, and the trunks are remarkable for having large protuberances on them. The leaves are laurel-shaped; the small blue flowers are on a branched spike; and the berries are small and black.

Properties. From the first species, which is called by the natives of the Brazils teocariba, is obtained the resin improperly called gum-elemi, or gum-lemon. This drug is brought to us from the Spanish West Indies, and sometimes from the East Indies, in roundish cakes, generally wrapped up in fig leaves. The best fort is fiftith, somewhat transparent, of a pale whithish yellow colour, inclining a little to green, of a strong not unpleasant smell. It almost totally dissolves in pure spirit, and sends over some part of its fragrance along with this menstruum in distillation: distilled with water, it yields a considerable quantity of pale-coloured, thin, fragrant, essential oil. This resin gives name to one of the official unguents, and is at present scarcely any otherwise made use of; though it is certainly preferable, for internal purposes, to some others which are held in greater esteem. The second species yields the balsam of Mecca, of Syria, or of Gilead, which is the most fragrant and pleasant of any of the balsams. The true balsam tree is found near to Mecca, which is situated about a day’s journey from the Red Sea, on the Asiatic side. It has a yellowish or greenish yellow colour, a warm bittersh aromatic taste, and an acidulous fragrant smell. It has long been held in great esteem. The Turks, who are in possession of the country in which it grows, value it much as an odoriferous ungent and cosmetic, and sell such a high price upon it, that it is adulterated when it comes into the hands of the dealers, so that it is very difficult to get genuine specimens of it. It has been recommended in great variety of complaints; but now it is generally believed that the Canada and copiva balm are equally efficacious, and will answer every purpose for which it can be used. Dr Alton says, that the furcet mark of this balm being pure and unadulterated is, its spreading quickly on the surface of water when dropped into it; and that if a single drop of it is let fall into a large bucket full of water, it immediately spreads all over the surface, and as it spreads, dissolves and disappears; but in about half an hour it becomes a transparent pel­licle covering the whole surface, and may be taken up with a pin, having lost its fluidity and colour, and become white and soft, cohering, and communicating its smell and taste to the water. This test, he says, all the balm he saw in Holland bore, though it is rare to get any from London that answers it. The balmamfera, or rose-wood, affords an excellent timber: it is also replete with a fragrant balm or oil, and retains its flavour and solidity though exposed to the weather many years. By subjecting this wood to distillation, Dr Wright thinks, a perfume equal to the oleum rhodii may probably be obtained.

ANA, among physicians, denotes a quantity equal to that of the preceding ingredient. It is abbrevi­ated thus, æ, or a.

ANA, in matters of literature, a Latin termination, adopted into the titles of several books in other languages.—Anas, or books in ana, are collections of the memorable sayings of persons of learning and wit; much the same with what we otherwise call table-talk.

Wolius has given the history of books in ana, in the preface to the Caxabanioniana. He there observes, that though such titles be new, the thing itself is very old; that Xenophon’s books of the deeds and sayings of Socrates, as well as the dialogues of Plato, are Socratiana: that the apophthegms of the philo­phers collected by Diogenes Laerius, the sentences of Pythagoras and those of Epicurus, the works of Athenaus, Stobus, and divers others, are so many anas. Even the Gemara of the Jews, with several other oriental writings, according to Wolius, properly be­long to the same class. To this head of ana may likewise be referred the Orphica, the Pythagorasæ, Æphesia, Pyrrhonea, &c.

Scaligeriana was the first piece that appeared with a title in ana. It was composed by Ifan de Vaffian, a young Champanois, recommended to Joach Scaliger by a young Champanois, recommended to Joach Scaliger by a young Champanois. Being much with Scaliger, who was daily visited by the men of learning at Leyden, de Vaffian wrote down whatever things of any moment he heard Scaliger say. And thus arose the Scaligeriana, which was not printed till many years after, at Geneva, in 1666. Patin. Let. 431.—Soon after came the Ferroniana, Thuana, Naudeana, Patineana, Sor­biana, Menagiana, Anti-Menagiana, Fureiana, Chev­rapana, Leibnishiana, Arlequiniana, Poggiana, &c.

ANABAPTISTON, the fame with ABAPTISTON.

ANABAPTISTS, a name which has been indiscriminately applied to Christians of very different principles and practices; though many of them object to the denomination, and hold nothing in common, besides the opinion that baptism ought always to be performed by immersion, and not administered before the age of discretion.

The word Anabaptists is compounded of αν, "new," ana.
This sect was soon joined by great numbers, and (as usually happens in sudden revolutions of this nature) by many persons whose characters and capacities were very different, though their views seemed to turn upon the same object. Their progress was rapid; for, in a very short space of time, their discourses, visions, and predictions, excited commotions in a great part of Europe and drew into their communion a prodigious multitude, whose ignorance rendered them easy victims to the illusions of enthusiasm. The most pernicious faction of all these which composed this motley multitude, was that which pretended that the founders of the new and perfect church, already mentioned, were under the direction of a divine impulse, and were armed against all opposition by the power of working miracles. It was this faction that, in the year 1521, began their fanatical work, under the guidance of Munzer, Stubner, Storck, &c.

These persons were disciples of Luther; but well knowing that their opinions were such as would receive no sanction from him, they availed themselves of his absence to disseminate them in Wittemburgh, and had the address to over-reach the piety of Melancthon. Their principal purpose was to gain over the populace, and to form a considerable party. To effect this, says Bayle, they were industrious and active, each in his own way. Storck, wanting knowledge, boasted of inspiration; and Stubner, who had both genius and erudition, laboured at commodious explications of Scripture. Not content with discrediting the court of Rome, and decrying the authority of confidories, they taught, That among Christians, who had the precepts of the gospel to direct and the Spirit of God to guide them, the office of magistracy was not only unnecessary, but an unlawful encroachment on their spiritual liberty; that the distinctions occasioned by birth, or rank, or wealth, being contrary to the spirit of the gospel, which considers all men as equal, should be entirely abolished; that all Christians, throwing their possessions into one common flock, should live together in that state of equality which becomes members of the same family; that, as neither the laws of nature nor the precepts of the New Testament had placed any restraint upon men with regard to the number of wives which they might marry, they should use that liberty which God himself had granted to the patriarchs.

They employed at first the various arts of persuasion in order to propagate their doctrine. They preached, exhorted, admonished, and reasoned in a manner that seemed proper to impress the multitude, and related a great number of visions and revelations with which they pretended to have been favoured from above. But when they saw that these methods of making profelytes were not attended with such a rapid success as they fondly expected, and that the ministry of Luther and other eminent reformers were detrimental to their cause, they then had recourse to more expeditious measures, and madly attempted to propagate their fanatical doctrine by force of arms. Munzer and his associates, in the year 1525, put themselves at the head of a numerous army, composed for the most part of the peasants of Sabinia, Thuringia, Franconia, and Saxony, and declared war against all laws, government, and magistrates of every kind, under the chimerical
merical pretext that Christ was now to take the reins of civil and ecclesiastical government into his own hands, and to rule alone over the nations. But this sedition was routed and dispersed, without much difficulty, by the Elector of Saxony and other princes; and Munzer's ringleader ignominiously put to death, and his factious counsellors scattered abroad in different places.

Many of his followers, however, survived, and propagated their opinions through Germany, Switzerland, and Holland. In the year 1533, a party of them settled at Munster under the direction of two Anabaptist prophets, John Matthias a baker of Haerlem, and John Bockholdt a journeyman-taylor of Leyden. Having made themselves masters of the city, they deposed the magistrates, confiscated the estates of such as had escaped, and deposited the wealth they amassed together in a public treasury for common use. They made preparations of every kind for the defence of the city; and sent out emissaries to the Anabaptists in the Low Countries, inviting them to assemble at Munster, which was now dignified with the name of Mount Zion, that from hence they might be deputed to reduce all the nations of the earth under their dominion. Matthias, who was the first in command, was soon cut off in an act of, cruelty by the bishop of Munster's army; and was succeeded by Bockholdt, who was proclaimed by a special designation of Heaven, as he pretended, king of Zion, and invested with legislative powers by the choice of Moabites. The extravagances of Bockholdt were too numerous to be recited; it will be sufficient to add, that the city of Munster was taken after a long siege, and an obstinate resistance; and Bockholdt, the mock monarch, was punished with a most painful and ignominious death.

It must, however, be acknowledged that the true rite of the numerous insurrections of this period ought not to be attributed to religious opinions. The first insurrections groaned under the most grievous oppressions; they took up arms principally in defence of their civil liberties; and of the commotions that took place. The Anabaptists boasted that they had availed themselves, than to have been the prime movers. See the article Reformation.

—That a great part of the main body, indeed, consisted of Anabaptists seems indisputable; and whatever fanaticism existed among them would naturally be called forth or inflamed by the situations that occurred, and run riot in its wildest shapes. At the same time it appears from history, that a great part also consisted of Roman-Catholics, and a still greater of persons who had scarcely any religious principles at all. Indeed, when we read of the vast numbers that were concerned in those insurrections, of whom it is reported that 100,000 fell by the sword, it appears reasonable to conclude that a great majority of them were not Anabaptists.

Before concluding this article, it must be remarked, that the Baptists or Mennonites in England and Holland are to be considered in a very different light from the enthusiasts we have been describing: and it appears equally uncandid and invidious, to trace up their distinguing sentiment, as some of their adversaries have done, to thole obnoxious characters, and there to stop, in order as it were to associate with it the ideas of turbulence and fanaticism, with which it certainly has no natural connexion. Their insurrection with some of those oppressed and infatuated people in denying baptism to infants, is acknowledged by the Baptists: but they disavow the practice which the appellation of Anabaptists implies; and their doctrines seem referable to a more ancient and respectable origin. They appear supported by history in considering themselves as the descendants of the Waldensians, who were grievously oppressed and persecuted by the despotic heads of the Romish hierarchy; and they profess an equal aversion to all principles of rebellion on one hand, and to all suggestions of fanaticism on the other. See Baptists.

—The denomination of Mennonites, by which they are distinguished in Holland, they derive from Menno, the famous man who latterly gave consternation and instability to their sect. See Mennonites.

ANABASII, in antiquity, were couriers who were sent on horseback, or in chariots, with dispatches of importance.

ANABATHRA, in ancient writers, denote a kind of steps or ladder whereby to ascend to some eminence. In this sense we read of the anabathra of theatres, pulpits, &c. Anabathra appears to have been sometimes also applied to ranges of seats rising gradually over each other.

ANABATHRA is more particularly applied to a kind of stone blocks raised by the high-way fides, to assist travellers in mounting or alighting, before the use of stirrups was invented. —The first author of this contrivance among the Romans was C. Gracchus brother of Tiberius.

ANABLEPS, in ichthyology, the trivial name of a species of cobitis. See Cobitis.

ANABOA, a small island situated near the coast of Loango in Africa, in E. Long. 5°. N. Lat. 1°. Here are several fertile valleys, which produce plenty of bananas, oranges, pine-apples, lemons, citrons, tamarinds, coconuts, &c. together with vast quantities of cotton. In this island are two high mountains, which, being continually covered with clouds, occasion frequent rains.

ANABOLEUM, or ANABOLE, in antiquity, a kind of great or upper coat, worn over the tunica.

ANABOLEUS, in antiquity, an appellation given to grooms of the stall, or squerries, who assisted their masters in mounting their horses. As the ancients had no stirrups, or stirrups that are now in use for mounting a horse, they either jumped upon his back, or were aided in mounting by anabolei.

ANACALYPTERIA, according to Suidas, were presents made to the bride by her husband's relations and friends when the first uncovered her face and showed herself to men. These presents were also called προνόαι: for among the Greeks, virgins before marriage were under strict confinement, being rarely permitted to appear in public, or converse with the other sex; and when allowed that liberty, wore a veil over their faces termed καπειτας, or καπειτης, which was not left off in the presence of men till the third day after marriage; whence, according to Hesychius, this was also called anacalypteron.
**ANA** [ 655 ] **ANA**

**Anacampseros**, in botany, a synonyme of the portulacas and several other plants.

**Anacampsteria**, in ecclesiastical antiquity, a kind of little edifices adjacent to the churches, designed for the entertainment of strangers and poor persons.

**Anacamp tic**, a name applied by the ancients to that part of optics which treats of refexion, being the same with what is now called *catoptrics*.

**Anacardium**, or cashew-nut tree: A genus of the monogynia order, belonging to the decandria class of plants; and in the natural method ranking under the 12th order, Holarkaem. The characters are: The calyx is divided into four parts, the divisions ovate and deciduous: The corolla consists of five reflected petals, twice the length of the calyx: The filament consists of ten epiphal filaments shorter than the calyx, one of them calcarated; the antherae are small and roundish: The pistillum has a roundish germen: The styles is subulate, inflected, and the length of the corolla: The stigma oblique: There is no pericarpium; the receptaculum is very large and flieky: The seed is a large kidney-shaped nut, placed above the receptaculum.

Of this only one species is as yet known to the botanists, viz. the occidentale. It grows naturally in the west Indies, and arrives at the height of 20 feet in those places of which it is a native. The fruit of this tree is as large as an orange; and is full of an acid juice, which is frequently made use of in making punch. To the apex of this fruit grows a nut, of the size of a hare’s kidney, but much larger at the end than at the other. The shell is very hard; and the kernel, which is sweet and pleasant, is covered with a thin film. Before a spot of ground, to which they retreat, they are apt to rot. If the nuts are fresh, the plants will come up in about a month.

**Anachropheosis**, in rhetoric, the fame with recapitulation. See Recapitulation.

**Anacharsis**, a famous Scythian philosopher, converted with Solon, and lived an austere life. Upon his return from his travels through Greece, he attempted to change the ancient customs of Scythia, and to establish those of Greece; which proved fatal to him. The king shot him dead in the wood with an arrow. A great many flataxes were credited to him after his death. He is said to have invented tinder, the anchor, and the potter’s wheel; but the latter is mentioned by Homer, who lived long before him. Anacharsis flourished in the time of Cæcilius.

**Anachoret**, in church history, denotes a hermit, or solitary monk, who retires from the society of mankind into some desert, with a view to avoid the temptations of the world, and to more at leisure for meditation and prayer. Such were Paul, Anthony, and Hilarion, the first founders of monastic life in Egypt and Palestine.

Anachores, among the Greeks, consist principally of monks, who retire to caves or cellars, with the leave of the abbot, and an allowance from the monastery; or who, weary of the fatigues of the monastery, purchase a spot of ground, to which they retreat, never appearing again in the monastery, unless on solemn occasions.

**Anachronism**, in matters of literature, an error with respect to chronology, whereby an event is placed earlier than it really happened. — The word is compounded of aνα, “higher,” and χρονος, “time.” Such is that of Virgil, who placed Dido in Africa at the time of Æneas, though in reality she did not come there till 300 years after the taking of Troy. — Anachronism, in ecclesiastics, whereby a fact is placed later and lower than it should be, is called *barbaresco*.

**Anaclastic glasses**, a kind ofHonorous phials or glasses, chiefly made in Germany, which have the property of being flexible; and emitting a vehement noise by the human breath. — They are also called *oxyg glases* by the Germans (*oxyg gliaser*), on account of the fright and disturbance they occasion by their reflection. — The anaclastic glasses are a kind of phials, with flat bellies, resembling inverted funnels, whose bottoms are very thin, scarce surpassing the thickness of an onion peel; this bottom is not quite flat, but a little convex. But upon applying the mouth to the orifice, and gently inspiriting, or as it were fucking out the air, the bottom gives way with a prodigious crack, and of convex becomes concave. On the contrary, upon expiring or breathing gently into the orifice of the same glasses, the bottom with no less noise bounds back to its former place, and become gibbous as before. — The anaclastic glasses first taken notice of were...
Analectics were in the castle of Goldbach; where one of the academicians, Nature Curiosa, having seen and made experiments on them, published a piece expressly on their history and phenomena. They are all made of a fine white glass. It is to be observed of these, 1. That if the bottom be concave at the time of inspiration, it will burst; and the like will happen if it be convex at the time of expiration. 2. A strong breath will have the same effect even under the contrary circumstances.

Analectics, that part of optics which considers the refraction of light, and is commonly called Dioptrics. See Dioptrics.

Anacleteria, in antiquity, a solemn festival celebrated by the ancients when their kings or princes came of age, and assumed the reins of government. It was so called, because proclamation being made of this event to the people, they went to salute their prince during the anacleteria, and to congratulate him upon his new dignity.

Anaclyticum, in the ancient art of war, a particular blast of the trumpet, whereby the fearful and flying soldiers were rallied and recalled to the combat.

Anacrinopale, anacrinopale, in antiquity, a kind of wrestling, wherein the champions threw themselves voluntarily on the ground, and continued the combat by pinching, biting, scratching, and other methods of offence. The Anacrinopale was distinguished from the Orthopale, wherein the champions stood erect. In the Anacrinopale, the weaker combatants sometimes gained the victory.

Anaclytisia, in antiquity, a kind of pillows on the dining-bed, wherein the guests used to lean. The ancient tricliniary beds had four pillows, one at the head, another at the feet, a third at the back, and a fourth at the breast. That on which the head lay, was properly called by the Greeks ἀνακρίτισις, or anacritis; by the Romans fulcum, sometimes πλευτα.

Anaclysis, a composition of astringent powders, applied by the ancients to the head, to prevent defluxions on the eyes.

Anaclyticos, in natural history, is a name given in the island of Ceylon to a very large and terrible rattlesnake, which often devours the unfortunate traveller alive, and is itself accounted excellent and delicious fare.

Anacreon, a Greek poet, born at Teos, a city of Ionia, flourished about 552 years before the Christian era. Polycrates, tyrant of Samos, invited him to his court, and made him share with him in his business and his pleasures. He had a delicate wit, as may be judged from the ineffable beauties and graces that thine in his works: but he was fond of pleasure, was of an amorous disposition, and addicted to drunkenness: yet, notwithstanding his debaucheries, he lived to the age of 83; when, we are told, he was choked by a grape-stone which stuck in his throat as he was regaling on some new wine of a small part of Anacreon's works that remain; for, besides his odes and epigrams, he composed elegies, hymns, and iambics. His poems which are extant were rescued from oblivion by Hen-
ANAGALLIS, a genus of the plant family Plumbaginaceae, is a beautiful small perennial plant, and produces blue flowers. It is frequently taken as food; it makes no unpleasing smell in the fields, but is not so common as the first. The third field is sometimes found wild in the fields, but it is not so common as the first. The third field is a beautiful small perennial plant, and produces numbers of fine blue flowers. The fourth is a native of Spain, and likewise produces blue flowers. The plants are very easily propagated by seeds; and if suffered to remain till their seeds fatten, they become troublesome weeds.—The arvensis is not unfrequently taken as food; it makes no unpleasant smell, and in some parts of Great Britain is a common pot-herb. All the species are eat by cows and goats, but refused by sheep; small birds are greatly delighted with the seeds.—Great medicinal virtues were formerly expected from the first two species; but they are now fallly disregarded.

ANAGNIA, (anc. geog.), a town of Latium, capital of the Hernici; which after a short resistance, submitted to the Romans, was admitted to the freedom of the city, yet without the right of suffrage, (Livy). It was afterwards a colony of Dukes Caeser, and walled round, and its territory assigned to the veterans, (Frontinus). Here Antony married Cleopatra, and divorced Octavia. Now Anagni, 36 miles to the east of Rome. E. Long. 13° 45'. Lat. 42° 48'.

ANAGOSTHA, or ANAGROSTES, in antiquity, a kind of literary servant, retained in the families of persons of distinction, whose chief business was to read to them during meals, or at any other time when they were at leisure. Cornelius Nepos relates of Atticus, that he had always an anagrostes at his meals. He never fell without reading; so that the minds of his guests were no less agreeably entertained than their appetites. The same custom, Eginhard observes, was kept up by Charlemagne, who at table had the histories and acts of ancient kings read to him. This custom seems to have been of a relic of that of the ancient Greeks, who had the praires of great men and heroes sung to them while at table. The ancient monks and clergy kept up the like usage, as we are informed by St Augustine.

ANAGOGICAL, signifies mysteries, transporting; and is used to express whatever elevates the mind, not only to the knowledge of divine things, but of divine things in the next life. This word is seldom used, but with regard to the different senses of Scripture. The anagogical sense is, when the sacred text is explained with a regard to eternal life, the point which Christians should have in view: for example, the rest of the fabbath, in the anagogical sense, signifies the repose of everlasting happiness.

ANAGOGY, or ANAGOG, among ecclesiastical writers, the elevation of the mind to things celestial and eternal. It is particularly used, where words, in their natural and primary meaning, denote something sensible, but have a further view to something spiritual or invisible.

ANAGOGY, in a more particular sense, denotes the application of the types and allegories of the Old Testament to subjects of the New; thus called, because the veil being here drawn, what before was hidden, is exposèd to open sight.

ANAGRAM (from the Greek ἀνάĕδωσα, backwards, and πρῶτον letter), in matters of literature, a transposition of the letters of some name, whereby a new word is formed, either to the advantage or disadvantage of the person or thing to which the name belongs. Thus, the anagram of Galenus is angelus; that of Logica, colleg; that of Albidius, sedulus; that of Loraine is alerion, on which account it was that the family of Loraine took alerions of their armory.—Calvin, in the title of his Institutes, printed at Straßburg in 1539, calls himself Aclivius, which is the anagram of Calvinus, and the name of an eminently learned person in the time of Charlemagne, who contributed greatly to the restoring of learning in that age.

Those who adhere strictly to the definition of an anagram, take no other liberty than that of omitting...
or retaining the letter $h$, at pleasure; whereas others make no scruple to use $e$ for $h$, $v$ for $w$, $s$ for $z$, and $c$ for $k$; and vice versa.

Besides anagrams formed as above, we meet with another kind in ancient writers, made by dividing a single word into several; thus $f_{i} s_{t} i_{n} s_{u} m_{a}_{s}$, are formed out of the word $f_{i} u_{l}_{i} n_{c}_{a}_{n}_{m}_{a}_{s}$.

Anagrams are sometimes also made out of several words: such is that on the question put by Pilate to our Saviour, *Quid est veritas?* whereof we have this admirable anagram, viz. *Eli vir qui adest*.

The Cabalists among the Jews are professed anagrammatists; the third part of their art, which they call *theomancy*, i.e. "changing," being nothing but the art of making anagrams, or of finding hidden and mystical meanings in names; which they do by changing, transposing, and differently combining, the letters of those names. Thus, of the letters of Noah's name, they make *pri graece; of No deus the Deusiah*, they make $n_{u} w_{u} r_{h}$ be *fuit reip.*

**Anagrammatist**, a maker or composer of anagrams. Thomas Billon, a provincial, was a celebrated anagrammatist, and retained by Lewis XIII. with a pension of 1200 livres, in quality of anagrammatist to the king.

**Anagros**, in commerce, a measure for grain used in some cities in Spain, particularly at Seville; 46 anagros make about 100 quarters of London.

**Anagryis**, stinking bean-tree: A genus of the monogyne order, belonging to the decandria class of plants; and, in the natural method, ranking under the 32d-order, *Papilionaceae*. The characters are: The calyx is a bell-shaped perianthium; The corolla is papilionaceous; the vexillum cordated, straight, emarginated; and twice as long as the calyx; the ala ovate and longer than the vexillum; the carina straight and very long: The stigma consists of 10 filaments; the anther simple: The pistillum has an oblong germen, a simple style, and a villous stigma: The pericarpium is an oblong legumen: The seeds are fix or more, and kidney-shaped.

Of this genus there is but one species, the fetida, which grows naturally in the southern parts of Europe. It is a shrub which usually rises to the height of eight or ten feet, and produces its flowers in April or May. These are of a bright yellow colour, growing in spikes, somewhat like the laburnum.

**Culture.** This plant may be propagated either by seeds, or by laying down the tender branches in the spring; but the first method is preferable. The seeds should be sown towards the end of March in pots filled with light earth, and plunged in a gentle hot-bed. The plants usually appear in a month, when they should be gradually exposed to the open air, that they may be hardened before winter. In the autumn and winter, they must be sheltered under a hot-bed frame: the spring following, they must be transplanted, each into a separate small pot, placed in a sheltered situation, and again removed into a frame to shelter them during the following winter. The second spring after the plants come up, some of them may be taken out of the pots, and planted in a border near a south wall, where, if they are protected in winter, they may remain.

**ANAK** or **Anakims**, the name of a place in Attica, of the tribe Erechtheis, where a fetid plant, called **Anagryis**, probably the fame with the foregoing, grew in great plenty, (Dieuroides, PIny, Stephanus;) and the more it was handled, the stronger it smelted: hence *coromercere anagryis* (or *anagrynum*), is to bring a misfortune on one's self, (Aristophanes.)

**ANAK**, the father of the Anakims, was the son of Arba, who gave his name to Kirjath-arba, or Hebron, Josh. xiv. 15. Anak had three sons, Shechun, Ahiman, and Talmai, (chap. xv. 14 and Numb. xiii. 22.) who, as well as their father, were giants, and who, with their poteity, all terrible for their fierceness and extraordinary stature, were called the **Anakims**; in comparison of whom the Hebrews, who were sent to view the land of Canaan, reported that they were but as grasshoppers. Numb. xiii. 1. Caleb, afflicted by the tribe of Judah, took Kirjath-arba, and destroyed the Anakims, (Judges i. 20. and Josh. xv. 14.) in the year of the world 2559.

**Analecta**, or **Analcetis**, in antiquity, a servant whose employment it was to gather up the off-falls of the table.

**Analecja**, word, is used to denote a collection of small pieces; as essays, remarks, &c.

**Analenema**, in geometry, a projection of the sphere on the plane of the meridian, orthographically made by straight lines and ellipses, the eye being supposed at an infinite distance, and in the east, or west, points of the horizon.

**Analamma**, denotes likewise an instrument of brafs or wood, upon which this kind of projection is drawn with an horizon and curfors fett to it, whereon the folitious colour, and all circles parallel to it, will be concentric circles; all circles lying to the eye, will be ellipses; and all circles whole planes pass through the eye, will be right lines. The use of this instrument is to shew the common astronomical problems; which it will do, though not very exactly, unless it be very large.

**Analepsis**, the augmentation or nutrition of an emaciated body.

**Analeptics**, restorative or nourishing medicines.

**Analogy**, in philosophy, a certain relation and agreement between two or more things, which in other respects are entirely different.

There is likewise an analogy between beings that have some conformity or resemblance to one another; for example, between animals and plants; but the analogy is still stronger between two different species of certain animals.

Analogy enters much into all our reasoning, and serves to explain and illustrate. A great part of our philosophy, indeed, has no other foundation than analogy.

It is natural for mankind to judge of things left known, by some similitude, real or imaginary, between them and things more familiar or better known. And where the things compared have really a great similitude in their nature, when there is reason to think that they are subject to the same laws, there may be
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Analogy. A considerable degree of probability in conclusions drawn from analogy. Thus we may observe a very great similitude between this earth which we inhabit, and the other planets, Saturn, Jupiter, Mars, Venus, and Mercury. They all revolve round the sun, as the earth does, although at different distances, and in different periods. They borrow all their light from the sun, as the earth does. Several of them are known to revolve round their axis like the earth, and, by that means, must have a like succession of day and night. Some of them have moons, that serve to give them light in the absence of the sun, as our moon does to us. They are all, in their motions, subject to the same law of gravitation, as the earth is.

From all this similitude, it is not unreasonable to think, that those planets may, like our earth, be the habitation of various orders of living creatures. There is some probability in this conclusion from analogy.

But it ought to be observed, that, as this kind of reasoning can afford only probable evidence at best; so, unless great caution be used, we are apt to be led into error by it. To give an instance of this: Anatomists in ancient ages, seldom dissected human bodies; but very often the bodies of those quadrupeds whose internal structure was thought to approach nearest to that of the human body. Modern anatomists have discovered many mistakes the ancients were led into, by their conceiving a greater similitude between the structure of men and of some beasts than there is in reality.

Perhaps no author has made a more just and a more happy use of his mode of reasoning, than Bishop Butler in his Analogy of Religion, Natural and Revealed, to the Constitution and Course of Nature. In that excellent work, the author does not ground any of the truths of religion upon analogy, as their proper evidence. He only makes use of analogy to answer objections against them. When objections are made against the truths of religion, which may be made with equal strength against what we know to be true in the course of nature, such objections can have no weight.

Analogy, reasoning, therefore, may be of excellent use in answering objections against truths which have other evidence. It may likewise give a greater or a less degree of probability in cases where we can find no other evidence. But all arguments drawn from analogy are still the weaker, the greater disparity there is between the things compared; and therefore must be weakest of all when we compare body with mind, because there are no two things in nature more unlike.

There is no subject in which men have always been so prone to form their notions by analogies of this kind, as in what relates to the mind. We form an early acquaintance with material things by means of our senses, and are bred up in a constant familiarity with them. Hence we are apt to measure all things by them; and to ascribe to things most remote from matter the qualities that belong to material things. It is for this reason that mankind have, in all ages, been so prone to conceive the mind itself to be some subtle kind of matter; That they have been disposed to ascribe human figure, and human organs, not only to angels, but even to the Deity.

To illustrate more fully that analogical reasoning from a supposed similitude of mind to body, which appears to be the most fruitful source of error with regard to the operations of our minds, the following instance may be given. When a man is urged by contrary motives, those on one hand inclining him to do one action, those on the other to forbear it; he deliberates about it, and at last resolves to do it, or not to do it. The contrary motives are here compared to the weights in the opposite scales of balance; and there is not perhaps any infinace that can be named of a more striking analogy between body and mind. Hence the phrasing of weighing motives, of deliberating upon actions, are common to all languages.

From this analogy some philosophers draw very important conclusions. They say, that as the balance cannot incline to one side more than the other, when the opposite weights are equal; so a man cannot possibly determine himself if the motives on both hands are equal; and as the balance must necessarily turn to that side which has most weight, so the man must necessarily be determined to that hand where the motive is strongest. And on this foundation some of the schoolmen maintained, that if a hungry afs were placed between two bundles of hay equally inviting, the beast must stand still and starve to death, being unable to turn to either, because there are equal motives to both. This is an instance of that analogical reasoning, which, it is conceived, ought never to be trusted; for the analogy between a balance and a man deliberating, though one of the strongest that can be found between matter and mind, is too weak to support any argument. A piece of dead inactive matter, and an active intelligent being, are things very unlike; and because the one would remain at rest in a certain cafe, it does not follow that the other would be inactive in a cafe somewhat similar. The argument is no better than this, that, because a dead animal moves only as it is pushed, and, if pushed with equal force in contrary directions, must remain at rest; therefore the same thing must happen to a living animal; for surely the similitude between a dead animal and a living, is as great as that between a balance and a man.

The derivation of the word Analogy indicates, as professor Caullion of Berlin observes, a resemblance discernible by reason. This is confirmed by the word analogy in which the term is used in geometry, where it signifies an equality of ratios. In explaining this subject, it is observed, there may be a resemblance between sensations and a resemblance between perceptions: the former is called physical resemblance, because it acts upon the physical or sentient faculty; the latter moral resemblance, because it affects the moral or rational faculty of man.

Every resemblance may be reduced to an equality in sensations or perceptions; but this supposes some equality in their causes: we say some equality, because the disposition of the organs, or of the soul, must necessarily affect the sensations or perceptions; but this can influence only their degree, and not their nature.

The character of one person resembles that of another only when they both speak and act so as to excite equal
equal preceptions, or, to speak more strictly, the same perception: when they both display vivacity or indifference, anger or meekness, on the same occasions, and both excite in the soul of the observer identical perceptions, or rather the same perception of vivacity or indifference, of anger or meekness. These identical perceptions and the sense of which will depend much on the disposition of the observer's mind, must have identical causes, or, in other words, the same cause; which is the vivacity or indifference, the anger or meekness, displayed by each of these characters.

Every physical resemblance may therefore be reduced to one or more equalities; and every moral resemblance to one or more identities. Wherever there is moral resemblance there is analogy. Analogy may therefore be reduced to identity, and always supposes comparison.

Two objects are said to have an analogy to each other, or are called analogous, when some identity is discovered upon comparing them. An analogical conclusion, is a conclusion deduced from some identity. The principles of analogy are a comparison of two objects; and one or more identities resulting from their being thus compared. The characters of analogy are—that two objects be compared—that there be one or more identities between these objects—and that this is discernible only by reason or intellect.

Physical resemblance is to the senses what analogy is to the understanding.—The former, when perfect, becomes equality; but the latter identity.

Resemblance and analogy are the foundations both of probability and of certainty. When we are not satisfied that the resemblance or the analogy is complete, we stop at probability; which becomes certainty when we are, or think we are, assured that the resemblance or the analogy is perfect.

In reasoning by analogy, we should be careful not to confound it with resemblance; and also not to deduce from the identity or identities, on which the analogy is founded, a conclusion, which has either no relation, or only a partial relation, to these identities.

The principal use of analogy in the investigation of physical and moral truth, according to our author, may be reduced to the four following: 1. By means of our senses to improve, first, our own judgment, and afterwards that of others, with respect to intellectual subjects. 2. To deduce a general from a particular truth. Having discovered and proved the truth of a proposition with respect to any particular object, examine whether this truth flows from a quality peculiar to this single object, or common to several objects. In the latter case all these objects may be comprehended under one general idea, founded on their common quality. Subdivide this general idea instead of the particular object, and the proposition will become general, without ceasing to be true; because whatever evidently and fully results from the identity, on which analogy is founded, must necessarily be true with respect to all those objects in which the analogy is the same.

3. To prove the truth or falsehood of propositions which cannot be otherwise determined. To discover new truths in both natural and moral philosophy.

Analogy, among grammarians, is the correspondence which a word or phrase bears to the geniuses and received forms of any language.

ANALYSIS, in a general sense, implies the resolution of something compounded, into its original and constituent parts. The word is Greek, and derived from ἔνωσις, to resolve.

Analysis, in mathematics, is properly the method of resolving problems by means of algebraical equations; hence we often find that these two words, analysis and algebra, are used as synonymous.

Analysis, under its present improvements, must be allowed the Apex or height of all human learning: it is this method which furnishes us with the most perfect examples of the art of reasoning; gives the mind an uncommon readiness at deducing and discovering, from a few data, things unknown; and, by using signs for ideas, presents things to the imagination, which otherwise seemed out of its sphere: by this, geometrical demonstrations may be greatly abridged, and a long series of arguments, wherein the mind cannot without the utmost effort and attention discover the connection of ideas, are hereby converted into sensible signs, and the several operations required therein effected by the combination of these signs. But, what is more extraordinary, by means of this art, a number of truths are frequently expressed by a single line, which, in the common way of explaining and demonstrating things, would fill whole volumes. Thus, by mere contemplation of one single line, whole sciences may be sometimes learnt in a few minutes time, which otherwise could scarce be attained in many years.

Analysis is divided, with regard to its object, into that of finite and infinites. See ALGEBRA.

Analysis of Finite Quantities, is what we otherwise call specific arithmetic or algebra. See ALGEBRA.

Analysis of Infinites, called also the New Analysis, is particularly used for the method of fluxions, or the differential calculus. See FLUXIONS.

Analysis, in logic, signifies the method of tracing things backward to their source, and of resolving knowledge into its original principles. This is also called the method of resolution; and stands opposed to the synthetic method, or that of composition.—The art of logical analysis consists principally in combining our perceptions, claffing them together with addresses, and contriving proper expressions for conveying our thoughts, and representing their several divisions, classes, and relations.

Analysis in rhetoric, is that which examines the connections, tropes, figures, and the like, inquiring into the proposition, division, passions, arguments, and other apparatus of rhetoric.

Several authors, as Freigius and others, have given analyses of Cicero's Orations, wherein they reduce them to their grammatical and logical principles, strip them of all the ornaments and additions of rhetoric which otherwise disguise their true form, and conceal the connection between one part and another. The design of these authors is to have those admired harangues just such as the judgment disposed them, without the help of imagination: so that here we may coolly view the force of each proof, and admire the use Cicero made of rhetorical figures to conceal the weak part of a cause.

A collection has been made of the analyses formed by the most celebrated authors of the 16th century, in 3 vols. folio.

Analysis is also used, in chemistry, for the de-compounding
To analyze bodies, or resolve them into their component parts, is indeed the chief object of the art of chemistry. Chemistry furnishes the means for the decomposition of bodies, which are all founded on the differences of the properties belonging to the different principles of which the body to be analyzed is composed. If, for example, a body be composed of several principles, none of which have a great, and others a moderate degree of volatility, and, lastly, others are fixed, its most volatile parts may be at first separated by a gradual heat in distilling vessels; and then the parts which are next in volatility will pass over in distillation; and lastly, those parts which are fixed, and capable of refilling the action of fire, will remain at the bottom of the vessel.

Analysis is also used for a kind of syllabus, or table of the principal heads or articles of a continued discourse, disposed in their natural order and dependence. Analyses are more scientific than alphabetical indexes; but they are less used, as being more intricate.

Analysis is likewise used for a brief, but methodical, illustration of the principles of a science; in which sense it is nearly synonymous with what we otherwise call a synopsis.

Analytic, or Analytical, something that belongs to, or partakes of, the nature of analyzis.—Thus we say, analytical demonstration, analytical process, analytical table or scheme, analytical method of investigation, &c.

The analytic method stands opposed to the synthetic. In natural philosophy, as in mathematics, the investigation of difficult things by the analytic method ought to precede the method of composition. This analysis consists in making experiments and observations, and in drawing general conclusions therefrom by induction; and admitting of no objections against the conclusions, but such as are drawn from experiments, and other certain truths: and though the reasoning from experiments and observations by induction be no demonstration of general conclusions, yet it is the best method of reasoning which the nature of things admits of; and may be esteemed so much the stronger, as the incompatibility of beliefs; and if no exception occur from phenomena, the conclusion may be pronounced general. By this way of analysis, we may proceed from compounds to their ingredients; from motions to the forces producing them; and, in general, from effects to their causes, and from particular causes to more general ones, until we arrive at those which are the most general. This is the analytic method, according to the illustrious Newton.

The synthetic method consists in assuming the causes discovered and received as principles: and by them explaining the phenomena proceeding from them, and proving the explanations. See Synthesis.

Analytics, Analysis, the form and use of analysis. The great advantage of the modern mathematics above the ancient is in point of analysis.

Pappus, in the preface to his seventh book of Mathematical Collections, enumerates among the authors on the ancient analytics; being Euclid, in his Data and Porify: Apollonius, de Sectione Rationis; and in his Conics; Aristeaus, de Lois Suidis; and Erotofthones, de Meditii Proportionibus. But the ancient analytics were very different from the modern.

To the modern analytics principally belong algebra; an historical account of which, with the several authors thereon, see under the article Algebra.

ANAMABA, a populous town in the kingdom of Fantin, in Guinea. The natives are generally great cheats, and must be carefully looked after in dealing with them, and their gold well examined, for it is commonly adulterated. It lies under the cannon of an English caisle. The landing is pretty difficult on account of the rocks; and therefore those that come here to trade are forced to go afloat in canoes. The earth here is very proper to make bricks; the oysters, when burnt, afford good lime; and there is timber in great abundance; so that here are all the materials for building. The country at Anamaba is full of hills, beginning at a good distance from the town, and affording a very pleasant prospect. Indian corn and palm-wine are in great plenty. They have a green fruit called papas, as big as a small melon, and which has a taffe like cauliflower. Anamaba is much frequented by the English ships and others for corn and slaves, which last are sometimes to be had in great numbers. The English fort is built on the foundation of a large old house, which subsisted entire in 1679. It is a large edifice, flanked by two towers, and fortified towards the sea with two battisons; the whole of brick and stone cemented with lime. It stands upon a rock, at the distance of 30 paces from the sea. It is mounted with 12 pieces of cannon and 12 pateroernes; and defended by a garrison of 12 whites and 18 blacks, under the command of the chief factor.

The natives treat the garrison of this fort with great insolence, inasmuch as often to block them up, and frequently, if they dislike the governor, send him off in a canoe to Cape Coast with marks of the utmost contempt. Far from being able to oppose them, the English are glad to obtain their favour with presents. In 1701, they declared war against the English; and having assembled in a tumultuous manner before the fort, they set fire to the exterior buildings, and went on with their outrages, till they were dispersed by a discharge of the cannon from the batteries. The night following the English took their revenge, by setting fire to the town of Anamaba; and thus hostilities continued for 20 days, till at last the natives were obliged to sue for peace. This fort was abandoned in 1733; but has been restored by the English, who have continued in it ever since.

ANAMIM, the second son of Nizram (Gen. x. 12.) Ananias, if we may credit the paraphrast Jonathan the son of Uzziel, depopulated the Marcopolis of Cyrene, according to the paraphrast of Jerusalem. Bochart is of opinion that these Anamims were the people that dwelt in the parts adjacent to the temple of Jupiter Ammon, and in the Nasaamotna.
Calmet thinks the Amanians and Garmantes to be descended from Anamim.

ANAMORPHOSIS, in perspective drawings, is a deformed or distorted portrait or figure, generally confused and unintelligible to the common unaided view; but when seen at a certain distance and height, or as reflected from a plain or curved mirror, will appear regular and in right proportion. See Optics (the Index), and Perspective.

ANANAS, in botany, the trivial name of a species of broomel. See Broemel.

ANANCITIS, in antiquity, a kind of figured stone, otherwise called symchitis, celebrated for its magical virtue of raising the shadows of the infernal gods.

ANANIAS, a Sadducee, high-priest of the Jews, who put to death St James the brother of our Lord, and was deposed by Agrippa.

ANANISABTA, or Ananisapa, a magical word frequently inscribed on coins and other amulets, supposed to have a virtue of preserving the wearer from the plague.

ANAPEST, in ancient poetry, a foot consisting of two short syllables and one long: Such is the word scepulius. It is just the reverse of the dactyI.

ANAPestic Verses, those consisting wholly or chiefly of anapaests.

ANAPHORAE (anc. geog.), an island spontaneously emerging out of the Cretan sea, near Thira (Pliny, Strabo); now called Naxos. Its name is from the sudden appearance of the new moon to the Argonauts in a form (Apollonius), Anaphaerus, an epithet of Apollo, who was worshipped there. Anaphoro, the people.

ANAPHORA, in rhetoric, the repetition of the same word or words in the beginning of a sentence or verse: Thus Virgil,

Pan etiam Arcadia nascitur ilia.
Pan etiam Arcadia ducta fel judicis verit.

Anaphora, among physicians, the throwing off purulent matter by the mouth.

ANAPHRODISIA, signifies impotence, or want of power to procreate. See Impotence.

ANAPLASIS, signifies the replacing or setting a fractured bone.

ANAPLORETICS, medicines that promote the growth or granulation of the flesh in wounds, ulcers, &c.

ANARCHI, Anergic, in antiquity, a name given by the Athenians to four supernumerary days in their year, dating which they had no magistrates. The Attic year was divided into ten parts, according to the number of tribes, to whom the precedence of the senate fell by turns. Each division consisted of 33 days; what remained after the expiration of these, to make the lunar year complete, which according to their computation consisted of 354 days, were employed in the creation of magistrates; and called anarchia anerget and anachon.

Anarchy, the want of government in a nation, where no supreme authority is lodged, either in the prince or other rulers; but the people live at large, and all things are in confusion. The word is derived from the Greek privative α, and αρχη, command prin-
Anarropia, Anas. Anas.

The eggs are accounted good food; and the flesh, especially that of the young, is much esteemed by the inhabitants. The nes of the feathers are manifest to every one; and the skins of the body are worn by the inhabitants; besides which, that of the legs, taken off, is sold and appears not unlike flaggare. Wild swans, Linnaeus says, frequently visit Sweden after a thaw, and are caught with apples in which a hook is concealed. The wild swan frequents the coasts of Great Britain, in hard winters, in large flocks, but does not breed there. Martin acquaints us, that swans come in October in great number to Lingey, one of the Western lakes; and continue there till March, when they return northward to breed. A few continue in Mainland, one of the Orkneys, and breed in the little islands of the fresh-water lochs: but the multitude retires at the approach of spring. On that account, swans are there the countryman's almanack: on their quitting the lake, they preface good weather; on their arrival, they announce bad. These, as well as most other water-fowl, prefer, for the purpose of incubation, those places that are least frequented by mankind: accordingly we find that the lakes and forests of the distant Lapland are filled during summer with myriads of water-fowl;
fowl; and there swans, geese, the duck-tribe, geese, divers, &c. pass that season; but in autumn return to other, more hospitable, shores.

This species has several distinctions from the species which in Britain is called the tame swan. In Russia this species more fairly claims the name, it being the kind most commonly tamed in that empire. The whistling swan carries its neck quite erect, the other swans with it arched. This is far inferior in size. This has twelve ribs on a side, the mute only eleven. But the most remarkable is the strange figure of the windpipe; which falls into the chest, then turns back like a trumpet, and afterwards makes a second bend to join the lungs. Thus it is enabled to utter a loud and shrill note. The other swan, on the contrary, is the most silent of birds: it can do nothing more than hiss, which it does on receiving any provocation. The vocal kind emits its loud notes only when flying or calling. Its sound is, _whoosh, whoosh_, very loud and shrill, but not disagreeable, when heard far above one's head and modulated by the winds. The natives of Russia compare it to the sound of a violin. It is a fact they hear it (says Mr Pennant) at the end of their long and gloomy winter; when the return of the swans announces the return of summer; every note must be therefore melodious which prefaces the speedy thaw, and the release from their tedious confinement.

It is from this species alone that the ancients have given the fable of the swan being ended with the powers of melody. Embracing the Pythagorean doctrine, they made the body of this bird the manifon of the souls of departed poets; and after that, attributed to the birds the same faculty of harmony which their inmates possessed in a pre-existent state. The vulgar, not distinguishing between sweetness of numbers and melody of voice, thought that real which the poets for the great poetical brethren in the same manner:

\[ Vars, tuum nomen \]

_Cantantes sublime ferent ad sidera cygni._

En. Lib. xi. 458.

It was also a popular opinion among the ancients, that the swan foretold its own end. To explain this, we must consider the twofold character of the poet, _vates_ and _poeta_, which the fable of the transmigration continues to the bird, or they might be supposed to derive that faculty from Apollo their patron deity, the god of prophecy and divination.

As to their being supposed to sing more sweetly at the approach of death, the cause is beautifully explained by Plato, who attributes that quality to their being in the same state of effigy that good men are sometimes said to enjoy at that awful hour, forseeing the joys that are preparing for them on putting off mortality.

The _manfactus_, or mute swan, is the largest of the British birds. It is distinguished externally from the wild swan; first, by its size, being much larger; secondly, by its bill, which in this is red, and the tip and sides black, and the skin between the eyes and bill is of the same colour. Over the back of the upper mandible, projects a black callous knot; the whole plumage, in old birds, is white; in young ones, all-coloured till the second year: the legs are dusky; but Dr Plot mentions a variety found on the Trent near Rugeley, with red legs.

The swan is found wild in Russia and Siberia, most plentiful in the last. It arrives later from the south, and does not spread so far north. Those about the southern part of the Caspian Sea are very large, and much esteemed for the use of the table. The swan is held in high estimation by the Mahometans. It is a very strong bird, and sometimes exceeding fierce: has not unfrequently been known to throw down and trample under feet youths of fifteen or sixteen years of age, and an old one to break the leg of a man with a stroke of the wings. It is said to be very long-lived, and frequently to arrive at the hundredth year. The young are not perfect in plumage till the second year.

The swan lays the first egg in February, and continues laying every other day to the amount of six, seven, or eight eggs; these it places on a bed of grass near the water, and fits six weeks. It feeds on both fish and herbage.

No bird, perhaps, makes so inellegant a figure out of the water, or has the command of such beautiful attitudes on that element, as the swan: almost every poet has taken notice of it; but none with that justness of description, and in so picturesque a manner, as Milton.

The swan, with arched neck

Between her white wings mantling, proudly rows Her state with oary feet. Far. Lok, B. vii.

In former times, it was served up at every great feast, when the elegance of the table was measured by the size and quantity of the good cheer. Cygnets are to this day fattened at Norwich about Christmas, and are sold for a guinea a-piece.

Swans were formerly held in such great esteem in England, that by an act of Edward IV. c. 6. "no one that possessed a freehold of less than a yearly value of five marks, was permitted to keep any, _other than the_ the swan of our sovereign lord, the king." And by the eleventh of Henry VII. c. 17. the punishment for taking their eggs was imprisonment for a year and a day, and a fine at the king's will. Though at present they are not so highly valued as a delicacy, yet great numbers are preserved for their beauty; multitudes are to be seen on the Thames and Trent, but no where greater numbers than the salt-water inlet of the sea near Abberbury in Dorsetshire.

2. The cygnoids, with a semicylindrical bill, gibus wax, and tumid eye-brows. It is the swan-goose of Ray, from Guinea. There is likewise a variety of this species, of a lefs size, called the geese of Missey. They are found wild about the Lake Balkal in the east of Siberia, and on the Nambotshaka. They are also kept tame in most parts of the Russian empire. These birds likewise inhabit China, and are common at the Cape of Good Hope. This is no doubt the species mentioned
mentioned by Kolben, called crop-goose; who says, that the failors make tobacco-pouches and purses of the membrane which hangs beneath the throat, as it is sufficiently tough for such purposes, and will hold two pounds of tobacco.

They are sufficiently common in Britain, and readily mix with the common goose; the breasts uniting as freely, and continuing to produce as certainly, as if no such mixture had taken place. They are much more noisy than the common tame goose, taking alarm at the least noise; and even without disturbance will emit their harsh and disagreeable scream the whole day through. They walk very erect, with the neck much elevated; and, as they bear a middle line between that of the swan and goose, they have not improperly been called wan-goose.

3. The tadorna, or fielddrake, has a flat bill, a compressed forehead, a greenish black head, and the body is variegated with white. This species is found as far as Iceland to the north. It visits Sweden and the Orkneys in the winter, and returns in spring. It is found in Asia about the Caspian Sea, and all the salt lakes of the Tartarian and Siberian deserts, as well as in Kamtchata. Late voyagers, if right in the species, have met with it at Falkland Isles and Van Diemen's Land. It breeds in deserted rabbit holes, or occupies them in the absence of the owners, who, rather than make an attempt at dislodging the intruders, form others; though, in defect of ready-made quarters, these birds will frequently dig holes for themselves. They lay fifteen or sixteen roundish white eggs. These are placed at the farther end of the hole, covered with down supplied from the breast of the female, who sits about 30 days. She is very careful of her young, and will often carry them from place to place in her bill: “This we are certain of (says Mr Latham), from a young one having been dropt at the foot of an intelligent friend unhurt, by the mother flying over his head.” When a person attempts to take their young, the old birds fly great address in diverting his attention from the brood; they will fly along the ground as if wounded, till the former are got into a place of security, and then return and collect them together. From this insinuating cunning, Turner, with good reason, imagines them to be the chenoapex or fox-goose of the ancients. The natives of the Orkneys to this day call them the fly-goose, from an attribute of that quadroon.

The young, as soon as hatched, take to the water, and swim surprisingly well; but do not come to their full plumage till the second year. This species, Mr Latham informs us, may be hatched under a tame duck, and the young readily brought up; but are apt, after a few years, to attempt the mastery over the rest of the poultry. In a state of nature, their food seems chiefly to be small fish, marine insects, and shells; herbage has likewise been found in their stomachs. In a tame state, they eat bread, grain, and greens. Their great beauty would tempt us to endeavour at domestickating the race; but it will not thrive completely, except in the neighbourhoood of salt water, which somehow seems essential to its well-being. The flesh Likewise is rank and unfavourable, though the eggs have at all times been thought very good.

4. The spéctabilis, has a compressed bill, gibbous at the base, a black feather carina, and a hoary head. It is the grey-headed duck of Edwards, and the king-duck of Pennant. This beautiful species is found at Hudson's Bay, at Churchill River, and (though scarce) at York Fort; in winter it is met with as far north as New-York. It is pretty frequent in the north of Siberia and Kamtchata; it is found also on the coast of Norway, and has been killed in the Orkneys. It is common in Greenland, where the flesh is accounted excellent, and the crude gibbous part of the bill a great delicacy. It produces a down equally valuable as the eider. The skins are sewed together, and make warm garments. The natives kill them with darts, and use the following method to succeed;—A number of men in canoes falling in with a flock while swimming, on a sudden set up a flouting, making as much noise as they can; on which, the birds being too much frightened to fly away, dive under the water; but as the place at which they are to rise again is known by the bubbling of the water above, the hunters follow them up as close as may be; and after acting this three or four times, the birds become so fatigued as to be easily killed. This species builds on the sides of ponds and rivers, making its nest of sticks and mosses, and lining it with feathers from the breast. It lays four or five whitish eggs, as large as those of the goose. The young fly in July. The food consists chiefly of worms and grafs.

5. The fusca, or velvet duck; is of a blackish colour, has a white spot behind the eyes, and a white line on the wings. The male of this species is distinguished by a gibbosity at the base of the bill. It is the black duck of Ray, and is in length about 20 inches. This species frequents Hudson's Bay in summer, where it breeds. The nest is composed of grafs; in which it lays from four to six white eggs, and hatches in July. It feeds on grafs, and is known by the names of cast ofä quatuor. It retires south in winter; when it is frequently seen as far south as New-York. Late navigators met with it at Aoonalaffika. It is now and then seen on the coasts of England, but is not common. It is more frequent on the continent, inhabiting Denmark and Rhufia. In some parts of Siberia it is very common; and it enters the list of those found at Kamtchata. In breeding-time, it goes far inland to lay the eggs; which are eight or ten in number, and white. After the seafon is over, the males are few, and wait to depart; the females staying behind till the young are able to fly, when the two last go likewise off, but to what part is not certain. It is in great plenty at Ochotska, especially about the equinox. Fifty or more of the natives go in boats and surround the whole flock, driving them into the flood of the river Ochotska; and, as soon as they are, the whole company fall on them at once with clubs, and often knock so many of them on the head that each man has 20 or 30 for his share.

6. The nigra, or scoter, is totally black, and has a gibbosity at the base of the bill; the tail resembles a wedge; the female is brownish. It is the leiffer black diver of Ray, and measures in length 22 inches. These birds are found on the northern coasts of England and the isle of Scotland in the winter seafon; but no where so common as on the French coasts, where they are seen in prodigious numbers from November to March, especially...
Their chief food is a glairy bivalve shell, near an inch long, called by the French "vainieux." These they are perpetually diving after, frequently to the depth of some fathoms; and an usual method of catching them is by placing nets under the water in such places as the shells are most numerous; by which means 30 or 40 dozen of them have been taken in one tide. The day seems to be spent by these birds between diving and flying to small distances from the water, which it does so as frequently to dip the legs therein. It swallows the food whole, and soon digests the shells, which are found quite crumbled to powder among the excrements. It has been kept tame for some time, and will feed on foaked bread. The flesh tastes fishy to an extreme; on which account is allowed by the Roman-Catholics to be eaten on fast days and in lent; and indeed must be a sufficient mortification.—These birds abound in all the northern parts of the continent, Lapland, Sweden, Norway, and Ruflia; and are found in great plenty on the great lakes and rivers of the north and east of Siberia, as well as on the sea shores. It likewise inhabits North-America; being met with at New-York; and in all probability much more to the north on this continent and that of Asia. Oftentimes having met with them in 30 and 34 degrees south latitude, between the island of Java and St. Paul, in the month of June.

7. The anser, feræ et manufactus; or gray lag, and tame geese. The grey lag or wild goose, is two feet nine inches in length, and five feet in extent. The bill is large and elevated; of a flesh colour, tinged with yellow; the head and neck cinereous; breast and belly whitish, clouded with gray or ash colour; back, grey; the legs of a flesh colour. This species resides in the fens the whole year; breeds there, and hatches about eight or nine young, which are often taken, easily tamed, and esteemed most excellent meat, superior to the domestic goose. Towards winter they collect in great flocks, but in all seasons live and feed in the fens. On the continent they are migratory, changing place in large flocks, often 500 or more: in this case, the flock is triangular in shape, with one point foremost; and as the goose which is first is tired sooner, it has been seen to drop behind, and another to take his place. In very small flocks, however, they are sometimes seen to follow one another in a direct line. Geese seem to be general inhabitants of the globe. The manufactus, is the grey lag in a state of domestication, and from which it varies in colour, though much less so than either the mallard or coot, being ever more or less vering to grey: though in all cases the whiteness of the vent, and upper tail coverts, is manifest. It is frequently found quite white, especially the males; and doubts have arisen, which of the two colours should have the preference in point of eating. Tame geese are kept in great multitudes in the fens of Lincolnshire, in England; a single person will have 1000 old geese, each of which will rear seven; so that towards the end of the season he will become possessed of 8000. During the breeding-season these birds are lodged in the same houses with the inhabitants, and even in their very bed-chambers: in every apartment are three rows of coarse wooden pens, placed one above another; each bird has its separate lodge divided from the other, which it keeps possession of during the time of sitting. A person called a "gozzard," i.e. goose-herd, attends the flock, and twice a day drives the whole to water; then brings them back to their habitations, helping those that live in the upper stories to their nests, without ever misplacing a single bird. The geese are plucked five times in the year: the first plucking is at Lady-day, for feathers and quills; the same is renewed, for feathers only, four times more between that and Michaelmas. The old geese submit quietly to the operation, but the young ones are very noisy and unruly. If the season proves cold, numbers of them die by this barbarous custom. Vast numbers of geese are driven annually to London, to supply the markets; among them, all the superannuated geese and ganders, which, by a long course of plucking, prove uncommonly tough and dry. The goose in general breeds only once in a year; but will frequently have two hatches in a season, if well kept. The time of sitting is about 30 days. They will also produce eggs sufficient for three broods, if they are taken away in succession. It is said to be very long-lived, as we have authority for their arriving at no less than 100 years.

8. The bean-geese, or two feet seven inches in length; in extent four feet eleven. The bill, which is the chief distinction between this and the former, is small, much compressed near the end, whitish, and somewhat pale red in the middle, and black at the base and nail: the head and neck are cinereous brown, tinged with ferruginous; breast and belly dirty white, clouded with cinereous; the back of a pale ash colour; feet and legs of a faffron colour: claws black. This species arrives in Lincolnshire in autumn; and is called the bean-geese, from the likeness of the nail of the bill to a horse-bean. They always light on corn-fields, and feed much on the green wheat. They never breed in the fens; but all disapper in May. They retreat to the sequestered wilds of the north of Europe; in their migration they fly a great height, cackling as they go. They prefer a great regularity in their motions; sometimes forming a straight line; at others, assuming the shape of a wedge, which facilitates their progress, for they cut the air reader in that form than if they flew pell-mell.

9. The erythropus, or laughing goose of Edwards, is a native of Europe and America. The length of this species is about two feet four; the extent four feet fix; the bill is elevated, of a pale yellow colour, with a white ring at the base; the forehead is white; the breast and belly are of a dirty white, marked with great spots of black; and the legs yellow. These visit the fens and other parts of England during winter, in small flocks; they keep always in marshy places, and never frequent the corn-lands. They disappear in the earliest spring, and none are seen after the middle of March. Linnaeus makes this goose the female of the bernacle; but Mr Pennant thinks his opinion not well founded.

The bernacle (erythropus mas Lin.) is two feet one inch in length, the breadth four feet five inches: the bill is black; the forehead and cheeks are white; from the bill to the eyes, there is a black line; the hind part of the head, the whole neck, and upper part of the breast and back, are of a deep black; the bill is black, the legs are of the same colour, and small. These birds appear
appear in vast flocks during winter, on the north-west coasts of Great-Britain; they are very fly and wild; but on being taken, grow in a few days as familiar as the tame goose. In February they retire as far as Lapland, Greenland, and even Spitzbergen, to breed. They live to a great age: the Rev. Dr Backworth of Spalding, had one which was kept in the family above 32 years, but was blind during the two last; what its age was when first taken, was unknown.

These are the birds that about 400 years ago were believed to be generated out of wood, or rather a species of shell that is often found flicking to the bottoms of ships, or fragments of them; and were called *tree-geese*. These were also thought by some writers to have been the *benedopeces* of Pliny; they should have had *cherenotes*, for those were the birds which that naturalist said were found in Britain: but as he has scarce left us any description of them, it is difficult to say which species he intended. Mr Pennant imagines it to be the following; which is far inferior in size to the wild-geese, and very delicate food, in both respects fulfilling his description of the *cherenotes*.

10. The race-horse or loggerhead goose, is in length 32 inches, and weighs from 20 to 30 pounds. The bill is three inches long, and of an orange colour: the irides are orange, surrounded with black, and then with orange: the head, neck, and upper parts of the body are of a deep ash-colour: the outer edge of the secondaries white, forming a band of the fame on the wing: the under parts of the body dusky down the middle; over the thighs cinereous blue; vent white; quills and tail black: the wings are very short, not reaching to the rump: on the bend of the wing is a yellow knob, half an inch in length; the legs are brownish orange, the webs dusky, and the claws black. These inhabit Falkland Islands, Staaten Land, &c. and were mofily seen in pairs, though sometimes they were observed in large flocks. From the shortness of their wings they were unable to fly; but they made considerable use of them when in the water, on which they seemed as much at ease, as they do on land, and were frequently seen swimming in great numbers.

II. The snow-geese is in length two feet eight inches, and weighs between five and six pounds. The bill is somewhat ferrated at the edges: the upper mandible scarlet, the lower white: the general colour of the plumage is snow-white, except the first ten quills, which are black, with white shafts: the legs are of a deep red. The young are of a blue colour, till they are two years old. These are very numerous at Hudson's-Bay, and called by the natives *Way-way* and *Wapa whe whe*. They visit Severn River in May, and stay a fortnight; but go farther north to breed; they return to Severn-Fort the beginning of September, and fly to the middle of October, when they depart for the south, and are observed to be attended with their young, in flocks innumerable. At this time many thousands are killed by the inhabitants; who pluck them, and take out the entrails, and putting the bodies into holes dug in the ground cover them with earth, which freezing above them, keeps them perfectly sweet throughout the severe season; during which there is no more to do than occasionally to open one of these hovels, when they find them sweet and good. They seem to occupy also the western side of America. In the summer months, they are plenty on the arctic coast of Siberia, but never migrate beyond longitude 130. They are sup posed to pass the winter in more moderate climates, as they have been seen flying at a great height over Siberia; probably on their passage to some other country, as it does not appear that they continue there. In like manner, those of America pass the winter in Carolina. Here they arrive in vast flocks; and feed on the roots of fage and grafs, which they tear up like hogs. It used to be a common practice in that country to burn a piece of a marsh, which enclosed the *cherenotes* there, as they could then more readily get at the roots, which gave the sportman opportunity of killing as many as he pleased. This species is the most numerous, and the most stupid of all the goose race. They seem to want the instinct of others, by their arriving at the mouth of the Arctic Atlantic rivers before the seafon in which they can possibly subsist. They are annually guilty of the same mistake, and annually compelled to make a new migration to the south in quest of food, where they pass their time till the northern estuaries are freed from the bonds of ice. They have no little of the thyness of other geese, that they are taken in the most ridiculous manner imaginable about Jakut, and the other parts of Siberia, which they frequent. The inhabitants first place, near the banks of the rivers, a great net, in a straight line, or else form a hovel of skins sewed together. This done, one of the company dresses himself in the skins of a white reindeer, advances towards the flock of geese, and then turns back towards the net or the hovel; and his companions go behind the flock, and by making a noise drive them forward. The simple birds mistake the man in white for their leader, and follow him within reach of the net, which is suddenly pulled down and captures the whole. When he chooses to conduct them to the hovel, they follow in the same manner; he creeps in at a hole left for that purpose, and out at another on the opposite side, which he closes up. The geese follow him through the first; and as soon as they are got in, he closes round, and secures every one.

12. The great goose is of a very large size, weighing near 25 or 30 Ruffian pounds. The bill is black; bale of tawny: body dusky; the under parts are white; the legs scarlet. It is found on the coast of Siberia, from the river Lena to Kamtchatka; and is taken in great numbers.

13. The rucoolls, or red-breasted goose, is in length 21 inches; weight three pounds troy. The bill is small and brown; the tail black; the irides are yellow brown; round the eyes fringed with brown; fore part of the head and crown black, passing backwards in a narrow stripe quite to the back; on the breast is a narrow band of white feathers with black ends forming
ing a band of white and another of black; the sides are striped with black; back and wings black, the left even with the tail; legs black. This most elegant of geese is found to breed from the mouth of the Ob, along the coasts of the icy sea, to that of the Lena. Its winter quarters are not certainly known. Small flocks are observed in the spring flying from the Caspian sea along the Volga northward, and are feared about Zanzey, between the sixth and tenth of April. They rest a little time on the banks of the Sarpa, but soon resume their arctic course. Their winter retreat is probably in Perse. They are highly esteemed for the table, being quite free from any filthy taste.

14. The casarca, or ruddy-geese, is larger than a mallard, and seems even larger than it really is, from the length of wing, and standing high on its legs. The bill is black; the irides are yellowish brown; forehead, cheeks, and throat, yellowish; fore part of the neck ferruginous, encircled with a collar of black, inclining to deep rufous on the throat; the breast and side are pale rufous; the belly is obscure; the back is pale; the lower part is undulated, hoary, and brown; not veering from dark rufous on the head and tail; the legs long and black. This species is found in all the southern parts of Russia and Siberia in plenty. In winter it migrates into India, and returns northward in spring. It makes the nest in the craggy banks of the Volga and other rivers, or in the hollows of the deferted hillocks of marmots; making it after the manner of the shieldrake, and is faith to form burrows for itself in the manner of that bird. It has been known also to lay in a hollow tree, lining the nest with its own feathers. It is monogamous: the male and female fit in turns. The eggs are like those of the common duck. When the young come forth, the mother will often carry them from the place of hatching to the water with her bill. They have been attempted to be domesticated, by rearing the young under tame ducks; but without success, as they are ever wild, effecting their escape the first opportunity; or, if the old ones are taken and confined, they lay the eggs in a dispersed manner, and never sit. The voice is not unlike the note of a clarinet, while flying; at other times they cry like a peacock, especially when kept tame; and now and then chuck like a hen. It is very choice of its mate; for if the male is killed, the female will not leave the young till she has been two or three times shot at. The flesh is thought very good food.

15. The bernicle is of a brown colour; with the head, neck, and breast, black; and a white collar. These birds, like the bernicles, frequent the British coasts in winter; and are particularly plenty, at times, on those of Holland and Ireland, where they are taken in nets placed across the rivers. In some dry seasons they have returned to the coasts of Picardy, in France, in such prodigious flocks, as to prove a pest to the inhabitants, especially in the winter of the year 1740, when these birds destroyed all the corn near the sea-coasts, by trampling it up by the roots. A general war for this reason was declared against them, and carried on in earnest, by knocking them on the head with clubs; but their numbers were so prodigious, that this availed but little: however, the inhabitants relieved from this scourge till the north wind which had brought them ceased to blow, when they took leave. They easily become tame; and, being fattened, are thought to be a delicate food. They breed pretty far north, returning southward in autumn. They fly in the shape of a wedge, like the wild geese, with great clamour. They are called in Shetland, Herra geese, from being found in that sound. They are common also in America; breeding in the islands, and along the coast, and feeding on high-water mark. Their food consists of plants, such as the small bitterns, and black-berried heads, sea-worms, berries, and the like. They are apt to have a filthy taste, but are in general thought good food. The same fable has been told of this bird as of the bernacle, in respect to its being bred from trees. Called at Hudson's-Bay, Wetha may pa new.

16. The canadenensis is brown; its head and neck are black, and the throat is white. It measures three and a half feet in length. It is found during the summer in Hudson's-Bay, and parts beyond; also in Greenland; and, in the summer months, in various parts of North-America, as far as Carolina. Numbers breed at Hudson's-Bay, and lay six or seven eggs; but the major part retire still farther north. Their first appearance in the Bay is from about the middle of April to about the middle of May, when the inhabitants wait for them with impatience, being one of the chief articles for food, and many years kill 3000 or 4000, which are salted and barrelled. Their arrival is the harbinger of spring, and the month is named by the Indians the geese-month. The British send out their servants, as well as Indians, to fleece these birds on their passage. It is in vain to pursue them; they therefore form a row of huts made of boughs, at musket-shot distance from each other, and place them in a line across the vast marshes of the country. Each hovel, or, as they are called, stand, is occupied by only a single person. These attend the flight of the birds, and on their approach mimic their call so well, that the geese will answer, and wheel, and come nearer the stand. The sportman keeps motionless, and on his knees, with his gun cocked, the whole time; and never fires till he has seen the eyes of the geese. He fires as they are going from him, then picks up another gun that lies by him, and discharges that. The geese which he has killed he sets upon sticks as if alive, to decoy others; he also makes artificial birds for the same purpose. In a good day (for they fly in very uncertain and unequal numbers) a single Indian will kill 200. Norwithstanding every species of goose has a different call, yet the Indians are admirable in their imitation of every one. In this sport, however, they must be very careful to secrete themselves; for the birds are very shy, and on the least motion fly off directly. On their return south, which is from the middle of August to the middle of October, much havoc is made among them; but these are preserved fresh for winter store, but putting them, feathers and all, into a large hole dug in the ground, and covering them with mould; and these, during the whole time of the frost's lasting, are found perfectly sweet and good. The Indians at Hudson's Bay call them Apigishiih. This species is now pretty common, in a tame state, both on the continent and in England; the great canal of Versailles hundreds are seen mixing with the swans with the greatest cordiality, and the name at Chantilly. In England, likewise, they are thought a great ornament to the pieces of water.
The flesh of the young birds is accounted good; and the feathers equal to those of other geese, in so much as to prove an article of commerce much in the favour of those places where they are in sufficient numbers.

17. The mollissima, or eider-duck, is double the size of the common duck, has a cylindrical bill, and the wax is divided behind, and wrinkled. The feathers which are very soft and valuable, fall off during incubation. The male is white above, but black below and behind: the female is greenish. This species is found in the Western Isles of Scotland, particularly on Oran­fa, Barra, Rona, and Hebrides, and on the Parn Isles; but in greater numbers in Norway, Iceland and Greenland; from whence a vast quantity of the down, known by the name of eider or edder, which these birds furnish, is annually exported. It is remarkably light, elastic, and warm qualities, make it highly esteemed as a stuffing for coverslets, by such whom age or infirmities render unable to support the weight of common blankets. This down is produced from the breast of the birds in the breeding season. It lays its eggs among the stones or plants near the shore; and prepares a soft bed for them, by plucking the down from its own breast: the natives watch the opportunity, and take away both eggs and nest: the ducks lays again, and repeats the pluck­ing of its breast: if she is robbed after that, she will still lay; but the ducks must supply the down, as her flock is now exhausted: but if her eggs are taken a third time, she wholly deserts the place. See Down.

These birds are not numerous on the isles; and it is observed that the drakes keep on those most remote from the sitting places. The ducks continue on their nests till you come almost close to them; and when they rife, are very low fliers. The number of eggs in each nest are from three to five, warmly bedded in the down; of a pale olive colour; and very large, glossy, and smooth. They now and then, however, lay so many as eight; for Van Trol informs us that no less than 16 have been found in one nest, with two females, who agree remarkably well together.—In America, this bird is found as far south as New-York, and breeds on the defart isles of New-England; but not common every where to the north. They are said to be con­stant to the same breeding places, and that a pair has been observed to occupy the same nest for 20 years to­gether. They take their young on their backs instantly to sea; then dive, to shake them off and teach them to swim for themselves. It is said, that the males are five years old before they come to their full colour: that they live to a great age, and will at length grow quite grey. Their food is shells, for which they dive to great depths. They are very numerous in the Eu­quinoxuslands, where, and in Greenland, they are called muttuck. The natives kill them on the water with darts, striking them the moment they appear after diving; and know the place from their being preceded by the rising of bubbles. The flesh is said to be much valued.

18. The maula, or scapu-duck, is less than the common duck. The bill is broad, flat, and of a greyish blue colour; the head and neck are black, glossed with green; the breast is black; the back, the coverts of the wings, and the scapulars, are finely marked with numerous narrow transverse bars of black and grey; the legs are dusky. Mr Willoughby acquaints us, that these birds take their name from feeding on scap, or broken shell-fish; they differ infinitely in colour, so that in a flock of 40 or 50 there are not two alike.

19. The mufchata, or Mufcovy duck of Ray, has a naked papillos face, and is a native of India.—It is bigger than the wild duck, being in length two feet. This species is pretty common in a domesticated state in almost every nation; and the breed ought to be encour­aged, as there is more flesh on it than on the common duck, and of a very good flavour. The eggs are rounder than those of a duck, and in young birds frequently incline to green. They lay more eggs, and are fitter than other ducks. In an unconfined state, they make the nest on the stumps of old trees, and perch during the heat of the day on the branches of such as are well clothed with leaves. When kept tame, they are sufficiently docile; and the male will not un­frequently associate and produce a mongrel breed with the common ducks. The name of Mufcovy duck was given to them from their exhaling a mucky odour, which proceeds from the gland placed on the rump in common with other birds.

20. The clypeata, or houveral of Ray, has the end of its bill broad, rounded, and furnished with a small hook. It is in length 27 inches; the female a trifle smaller. Both sexes are apt to vary much in colour; the male likewise differs from the female inwardly, hav­ing just above the divarication of the windpipe where it passes into the lungs, an enlargement, or, as it is called by some, a labyrinth.—This bird is now and then met with in England, though not in great numbers. It is said to come into France in February, and some of them to stay during the summer. It lays 10 or 12 rufous-coloured eggs, placed on a bed of rushes, in the same places as the summer-teal; and departs in September, at least the major part of them, for it is rare that one is seen in winter. The chief food of this bird is insects, for which it is continually muddling in the water with its bill. It is also said dexterously to catch flies which pafs in its way over the water. Shrimps, among other things, have been found in its stomach on dissection. This species is also found in most parts of Germany; throughout the Russian dominions, as far as Kamtschatka; and in North-America, in New-York and Carolina, during the winter season. It is accounted pretty good food.

21. The irepera, or gad-wall, has the wings varie­gated with black, white, and red. It inhabits England in the winter months, and is also found at the same season in various parts of France and Italy. It migrates as far as Sweden, as summer advances, in order to breed; and is found throughout Ruffia and Siberia, except in the eastern part of the last, and Kamtschatka. Being a very quick diver, it is difficult to be shot. It feeds morning and evening only, being hid among the reeds and rushes during the day. The noise it makes is not unlike that of a mallard, but louder. The flesh is good.

22. The clangula, or golden eye of Ray, is varie­gated with black and white, and the head is inter­feread with blackish green feathers: it has a white spot near the mouth; and the eyes are of a tining gold col­our. It is not unfrequent on the sea-coasts in winter, and
Frequently in order to breed. It inhabits Sweden and Norway during the summer. It is an excellent diver, and feeds on small shells. It is mostly seen in the water, as it is very awkward in walking. It has been attempted to be domesticated, but seems out of its element on land. With difficulty it can be caught; and the feet soon grow injured, in so much as at last to hinder it from walking. The flesh is much esteemed, and the birds are often seen in the market at the proper season. This species is found in America; in winter as low as New-York; in summer, at Hudson's Bay, where it frequents the fresh-water lakes, and makes in hollow trees a round nest of grass lined with feathers from its breast; lays from seven to ten white eggs.

23. The merfa, or Ural duck of Pallas, is somewhat bigger than the common teal. The bill is large, broad, very tumid above the nostrils, and bird in the adult bird, the end marked with diverging fleshy; colour blue: the head, and part of the neck, are white; on the crown is a large patch of black: the middle of the neck is black: the fore-parts of the body are a yellowish brown, undulated with black: the back is clouded with a cinereous and pale yellow, powdered with brown: the wings are small: the tail longish, wedge-shaped, and black: the legs are brown, on the fore-part bluish, and placed as far back as in the diver genus. This species is not unfrequent in the greater lakes of the Ural mountains, and the rivers Ob and Irifich. It is not seen on the ground, for from the situation of its legs it is unable to walk; but it swims very well and quick: at which time the tail is immerced in the water as far as the rump, serving by way of rudder, contrary to the common method of a duck's swimming. The nest is formed of reeds, and floats, something like to that of the grebe.

24. The American wigeon (le canard jenfon of Buffon), is rather bigger than the European wigeon. The bill is of a lead colour: the crown and forehead of a yellowish white: the hind-part of the neck and head is black and white, speckled: and behind the eye is a black mark, changing in some lights to green: the back and scapulars are of a pale rust-colour, waved with transverse black lines; in the middle of the wing coverts there is a large bed of white: the quills and tail are deep brown: the legs dusky. It inhabits North-America, from Carolina to Hudson's Bay; but is no where a common bird. It is called at New-York the Phoebant Duck. It is more plenty at St Domingo and Cayenne, where it is called wingeon or gingeon. At Martinico great flocks of them often take short flights from one rice plantation to another, where they make much havoc, particularly during the rainy season. They are said to perch on trees. They feed in company and have a sentinel on the watch like some other birds. They are seldom seen during the day, lying hid in places shaded from the sun: but so soon as that luminary disappears, they come forth from their hiding-places to feed; and, during this, make a particular kind of noise, by which the sportsman is directed in his search after them: at other times their note is a kind of feeble whistle, which is often imitated in order to decoy them within reach of the gun. They fit in January; and in March the young are seen running about. They lay many eggs.

Sometimes these are hatched under hens; in which case they are, white young, familiar, though when grown up exceedingly quarrelsome with other ducks; their flesh is most excellent, especially such as are brought up tame. They appear upon the coast of Hudson's Bay in May, as soon as the thaw comes on, chiefly in pairs: they lay there only from six to eight eggs; and feed on flies and worms in the swamps. They depart in flocks in autumn. They are known by the name of atbikimo.
The wild-ducks pair in Bay; also in Greenland, where it frequents, during summer, bays and rivers, especially near their mouths, found from Carolina to Newfoundland, and Handol's and ly, and is very clamorous. It feeds on it frequents, as well as the feeds of the

30. The creca, or common teal, has the prime feathers of the wings blackish. This and the

31. The minuta, or little white and brown duck of Edwards, is of a greyish colour, with white ears, and the prime feathers of the wings blackish. This and the former, according to Latham, are found both on the Old and new continents. On the first, it is seen as far south as the lake Baikal to Kamtschatka; and breeds there, as well as every where else about the most rapid rivers and raging torrents. It is of a small size, only 1 4 inches in length. The teal is frequent in the London markets along with the wild duck. It is met with in Duddingston-loch, a fresh-water lake, within a mile of Edinburgh. In France it plays throughout the year, and makes a nest in April among the rushes, on the edges of ponds; it is composed of the tenderest flanks of them, with the addition of the pith, and a quantity of feathers. The nest is of a large size, and placed in the water, so as to rife and fall with it. The eggs are the size of those of a pigeon, of a dirty white, marked with small hazel spots. It is said to feed on the grasses and weeds which grow on the

32. The bobchas, common wild-duck of Ray, or mallard, the intermediate tail-feathers of the drake are turned backward, and the bill is stiffer. It frequents the lakes of different countries, and feeds upon frogs and several sorts of insects.—The wild-ducks pair in the spring: build their nests among rushes near the water, and lay from 10 to 16 eggs. The female is a very artful bird; and does not always make the nest close to the water, but frequently at a good distance from it; in which case the duck will take the young in its beak or between its legs. It is known sometimes to lay the eggs in a high tree, in a deserted magpie's or crow's nest. At molting-time, when they cannot fly, they are caught in great numbers. They abound greatly in Lincolnshire, the great magazine of wild-fowl in Great Britain; where prodigious numbers are taken annually in the Decays. Birds with flat bills, that find their food by groping, have three pair of nerves that extend to the end of their bills: these nerves are remarkably conspicuous in the head and bill of the wild-duck, and, are larger than those of a goose or any other bird yet known: this is the reason they grope for food more than any other bird whatever.—The common tame species of ducks take their origin from these, and may be traced to it by unerring characters. The drakes, howsoever they vary in colours, always retain the curled feathers of the tail, and both fixes the form of the bill, of the wild kind. Nature sports in the colours of all domestic animals; and, for a wife and useful end, that mankind may the more readily distinguish and claim their respective property.

In France this species is not often seen, except in winter; appearing in October, and going north in spring. They are caught in various manners; among the reeds, in decoys, as in England; the chief place for which is Picardy, where prodigious numbers are taken, particularly on the river Somme. It is also customary there to wait for the flocks passing over certain known places, and the sportsman, having a wicker cage, containing a quantity of tame birds, lets out one at a time, at a convenient season, which enticing the strangers within go, and are often killed at once by an expert markman. They are caught and then taken also by a hook baited with a bit of sheep's lights, which swimming on the water, the bird swims after the bait, and with it the hook. Various other means of catching ducks and geese are peculiar to certain nations; of which one seems worth mentioning from its singularity: The person willing to take these, wades into the water up to the chin, and having his head covered with an empty calabash, approaches the place where the ducks are; when they, not regarding an object of this sort, suffer the man freely to mix with the flock; after which he has only to pull them by the legs under the water, one after another, till he is satisfied; returning as unsuspected by the remainder as when he first came among them. This method is frequently put into practice on the river Ganges, using the earthen vessels of the Genoos instead of the calabashes: these vessels are what the Genoos boil their rice in, and are called Kutcharee pots (they likewise make a dish for the tables in them, which goes by the same name); after these are once used they look upon them as defiled, and in course throw them into the river as useless; and the duck-takers find them convenient for their purpose, as the ducks,
ducks, from constantly seeing the vessels float down the stream, look upon them as objects of full as little regard as a calabash. The above, or some such method, is also practised in China as well as in India. The Chineese, however, though they make great use of ducks, do not prefer the wild, being in general extremely fond of tame ones: and is aHo practised eggs, being laid in boxes of sand, are placed on a brick hearth, to which is given a fortnight time required for hatching. The ducklings are fed on oat return at command. This method is used nine months succeeding; and is so far from put of cutting the rice and glean ing the crop, when the vide them an old ilepmother, who leads them where rice plantations, as they are overflowed at high water. feed at large on the same fpot, and on a signal given for'fome thoufands, belonging It is will follow their leader to their respective fampanes, to see how the ducks .is a black body and the wings spotted with white. This {pecies'is found in Europe as far as Norway. In the winter months it is not unfrequent in England; being met with in the markets in that feaon, and is much efeemed. It is common also throughout the Ruffian empire, going northward to breed. Is frequente seen that the male dis appears during the incubation of the female.

There are 62 other species enumerated by ornithologists; the whole number hitherto described being 98.

ANASARCA, a species of droppy. See Medici ne.

ANASSUS, or ANAXUS (anc. geog.), a river in the territory of Venice, (Pliny); now the Piave, which riling from the mountains of Tyrol, not far from the borders of Carinthia, runs from north to south, thro' the territories of Cadorn, Belluno, Feltre, and, after running from west to east, through Trevisi, falls into the Adriatic, 13 miles to the south-east of Ve ni ce.

ANASTASIS, a term among ancient physicians, for a rising up to go to food. It also signifies the passage of any humour, when expelled from one part, and obliged to remove to another.

ANASTASUS I. emperor of the caft, succeeded Zeno in the year 491, and was inaugurated that same year on April the rith. The Manicheans and Arians were greatly in hopes of being supported by the new emperor; the former because his mother was their friend, and favoured their sect; the latter because the emperor's uncle was of their opinion: but if Ana stasius did not persecute them (as we do not find he ever did), yet it does not appear that he supported either of these sects. But in order to maintain the peace of the church, upon which the tranquility of the state very much depended, he declared, that such bishops or other clergymen who should disturb the public tranquility, by maintaining with too much heat either side of the question for or against the Council of Chalcedon, should be deprived of their benefits. Accordingly the disputes concerning Eutychianism running to a very great height, and Euphemius being deeply con cerned
ANA

[ 673 ]

869 at the fourth general council, the acts and canons of which he translated from the Greek into Latin. He also composed the lives of several popes, and other works; the best edition of which is that of the Vatican.

ANASTATICA, the rose of Jericho: A genus of the filiculosa order, belonging to the tetradyamia class of plants; and, in the natural method, ranking under the 39th order, Siliquojoe. The characters are: The calyx is a perianthium consisting of four leaves, and pistilliferous; the corolla consists of four cruciform petals: The samina consists of fix subulate filaments the length of the calyx; the anthera are roundish: The pisiflum has a small bifid germen; the stylus mucronated and oblique; the stigma headed: The pericarpium is a short bilocular fistle, retuse, and crowned on the margin with valvulae twice as long as the partition: The seeds are solitary and roundish.—Of this genus there are two

Species. 1. The syriaca, a native of Syria, is not cultivated or known in Britain. 2. The hierochina is a native of the sandy parts of Palestine and the Red Sea. It is a low annual plant, dividing into many irregular woody branches near the root. At each joint is placed a single, oblong, hairy leaf; and at the same places come out small fingle flowers, of a whitish green colour, composed of four leaves placed in the form of a crofs. These are succeeded by short wrinkled pods, having four small horns; these open into four cells, in each of which is lodged a single brown seed.—When the seeds of this plant are ripe, the branches will draw up and contract; so that the whole plant forms a kind of ball or globular body, which will expand on laying it a short time in warm water. This property it retains for many years, on which account it is preferred as a curiosity by some people. From this property the monks have given it the name of Rose Maria, pret­ending that the flowers open on the night in which our Saviour was born.

Culture. This plant is propagated by seeds, which should be sown in the beginning of March, in a moderate hot-bed in pots, in which the plants are designed to remain. When they come up, the plants should be thinned, leaving them about six inches asunder, and observing to keep them clear of weeds, which is all the care they require. If the felen proves favourable they will flower in August; but unless the autumn proves warm and dry, they will not perfect their seeds in Britain.

ANASTOMOSIS, in anatomy, the opening of the mouths of vessels, in order to discharge their contained fluids. It is likewise used for the communication of two vessels at their extremities: as the inoculation of a vein with a vein, of an artery with an artery, or of an artery with a vein.

ANASTOMATIC, medicines supposed to have the power of opening the mouths of the vessels, and promoting the circulation; such as deobstruente, cathartique, and sudorifique medicines.

ANASTROPHE, in rhetoric and grammar, denotes the inversion of the natural order of the words: such is, fana per et scopulis, for per fana et scopulis.

ANASUS, or ANIUS (anc. geog.) now the Enz, a river of Germany; which, rising on the borders of
A N A

The art of dissecting, or artificially separating and taking to pieces, the different parts of the human body, in order to an exact discovery of their situation, structure, and economy. —The word is Greek, ἀνατομία, derived from ἀνατομεῖν, to dissect, or separate by cutting.

INTRODUCTION.

§ 1. History of Anatomy.

This art seems to have been very ancient; though for a long time, known only in an imperfect manner. —The first men who lived must have soon acquired some notions of the structure of their own bodies, particularly of the external parts, and of some even of the internal, such as bones, joints, and sinews, which are exposed to the examination of the fowens in living bodies.

This rude knowledge must have been gradually improved, by the accidents to which the body is exposed, by the necessities of life, and by the various customs, ceremonies, and superstitions, of different nations. Thus, the observance of bodies killed by violence, attention to wounded men, and to many diseases, the various ways of putting criminals to death, the funeral ceremonies, and a variety of such things, must have shown men every day more and more of themselves; especially as curiosity and self-love would here urge them powerfully to observation and reflection.

The brute-creation having such an affinity to man in outward form, motions, senses, and ways of life; the generation of the species, and the effect of death upon the body, being observed to be so nearly the same in both; the conclusion was not only obvious, but unavoidable, that their bodies were formed nearly upon the same model. And the opportunities of examining the bodies of brutes were so easily procured, indeed so necessarily occurred in the common business of life, that the hunter in making use of his prey, the priest in sacrificing, the angler in divination, and, above all, the butcher, or those who might out of curiosity attend upon his operations, must have been daily adding to the little stock of anatomical knowledge. Accordingly we find, in fact, that the South-sea-islanders, who have been left to their own observation and reasoning, without the assistance of letters, have yet a considerable share of rude or wild anatomical and physiological knowledge. Dr Hunter informs us, that when Omai was in his museum with Mr Banks, though he could not explain himself intelligibly, they plainly saw that he knew the principal parts of the body, and something like the use of their ures, and manifested a great curiosity or desire of knowing the functions of the internal parts of the body explained to him; particularly the relative functions of the two sexes, which with him seemed to be the most interesting object of the human mind.

We may further imagine, that the philosophers of the

ANATOMY,
History.

Anatomy.

the most early ages, that is, the men of curiosity, observation, experience and reflection, could not overlook an instinct of natural organization, which was so interesting, and at the same time so wonderful, more especially of them as applied to the study and cure of diseases. We know that physic was a branch of philosophy till the age of Hippocrates.

Thus the art must have been circumstanced in its beginning. We shall next see from the testimony of historians and other writers, how it actually appeared as an art, from the time that writing was introduced among men; how it was improved and conveyed down to us through a long series of ages.

Civilization, and improvements of every kind, would naturally begin in fertile countries and healthful climates, where there would be leisure for reflection, and an appetite for amusement. Accordingly, writing, and many other useful and ornamental inventions and arts, appear to have been cultivated in the eastern parts of Asia long before the earliest times that are treated of by the Greek or other European writers; and that the arts and learning of those eastern people were in subsequent times gradually communicated to adjacent countries, especially by the medium of traffic. The customs, superstitions, and climate of eastern countries, however, appear to have been as unfavourable to practical anatomy, as they were inviting to the study of astronomy, geometry, poetry, and all the other arts of peace.

Animal bodies there, run so quickly into noxious putrefaction, that the early inhabitants must have avoided such offensive employments, as anatomical inquiries, like their polarity at this day. And, in fact, it does not appear, by the writings of the Grecians, or Jews, or Phoenicians, or of other eastern countries, that anatomy was particularly cultivated by any of those eastern nations. In tracing it backwards to its infancy, we cannot go farther into antiquity than the times of the Grecian philosophers. As an art in the state of infancy, it may be said to have been brought forth and bred up among them as a branch of natural knowledge.

The æra of philosophy, as it was called, began with Thales the Miletian being declared by a very general consent of the people, the most wise of all the Grecians, 480 years before Christ. The philosophers of his school, which was called the Ionian, cultivated principally natural knowledge. Socrates, the seventh in succession of their great teachers, introduced the study of morals, and was thence said to bring down philosophy from heaven, to make men truly wise and happy.

In the writings of his scholar and successor Plato, we see that the philosophers had carefully considered the human body, both in its organization and functions; and though they had not arrived at the knowledge of the more minute and intricate parts, which required the successive labour and attention of many ages, they had made up very noble and comprehensive ideas of the subject in general. The anatomical descriptions of Xenophon and Plato have had the honour of being quoted by Longinus (§ xxxii.) as specimens of full-time writing: and the extract from Plato is still more remarkable for its containing the rudiments of the circulation of the blood. "The heart (says Plato) is the centre or knot of the blood vessels; the spring, or fountain of the blood which is carried impetuously round; the blood is the pabulum or food of the flesh; and, for the purpose of nourishment, the body is laid out into canals, like those which are drawn through gardens, that the blood may be conveyed, as from a fountain, to every part of the pervious body."

Hippocrates was nearly contemporaneous with the great physicians of whom we have been speaking, about 400 years before the Christian era. He is said to have separated the profession of philosophy and physic, and to have been the first who applied to physic alone as the business of his life. He is likewise generally supposed to be the first who wrote upon anatomy. We know of nothing that was written expressly upon the subject before; and the first anatomical dissection which has been recorded, was made by his friend Democritus of Abdera.

If, however, we read the works of Hippocrates with impartiality, and apply his accounts of the parts to what we now know of the human body, we must allow his descriptions to be imperfect, incorrect, sometimes extravagant, and often unintelligible, that of the bones only excepted. He seems to have studied these with more success than the other parts, and tell us that he had an opportunity of seeing an human skeleton.

From Hippocrates to Galen, who flourished towards the end of the second century, in the decline of the Roman empire, that is, in the space of 600 years, anatomy was greatly improved; the philosophers still considering it as a most curious and interesting branch of natural knowledge, and the physicians, as a principal foundation of their art. Both of them, in that interval of time, contributed daily to the common flock, by more accurate and extended observations, and by the lights of improving philosophy.

As these two great men had applied very particularly to the study of animal bodies, they not only made great improvements, especially in physiology, but raised the credit of natural knowledge, and spread it as wide as Alexander's empire.

Few of Aristotle's writings were made public in his lifetime. He affected to say that they would be unintelligible to those who had not heard them explained at his lectures; and, except the use which Theophrastus made of them, they were lost to the public for above 150 years after the death of Theophrastus; and at last came out defective from bad preservation, and corrupted by men, who, without proper qualifications, presumed to correct and supply what was lost.

From the time of Theophrastus, the study of natural knowledge was long in decline: and the reputation of the Lyceum and Academy was almost confined to the studies which are subverient to oratory and public speaking.

The other great institution for Grecian education, was at Alexandria in Egypt. The first Ptolemies, both from their love of literature, and to give true and permanent dignity to their empire, and to Alexander's favourite city, set up a grand school in the palace itself, with a museum and library, which, we may say, has been the most famed in the world. Anatomy, among other sciences, was publicly taught; and the two distinguished anatomists were Erasistratus the pupil and friend of Theophrastus, and Herophilus. Their voluminous
ANATOMY.

History.  

A T T H I S  a period of investigation and discovery, the study of anatomy was in a state of flux and evolution. It was during this time that some of the most significant contributions to the field were made, both by ancient and modern scholars. The work of Galen, in particular, was foundational to the development of anatomical knowledge. His works are still studied and referenced today, although many of his theories have been revised and corrected.

The Roman empire, under the leadership of Julius Caesar and others, was a time of great expansion and exploration. It was during this period that the word "anatomy" was first used. The Romans were known for their medical advancements, and their work continued to influence the field even after their fall.

Throughout history, anatomy has been a subject of great interest and study. From the ancient Greeks and Romans to the modern day, scientists and physicians have sought to understand the human body and its functions. The study of anatomy is a vital part of medical education, and it continues to be a field of active research and discovery.
History.

A N A T O M Y.

continued to be almost the only book which was read up-
on the subject for above 200 years. Corethius gives
him the credit of being the great refiner of anatomy,
and the first who dissected human bodies among the
moderns.

A general prejudice against dissection, however, pre-
vailed till the 16th century. The emperor Charles V.
ordered a consultation to be held by the divines of Sal-
amanca, in order to determine whether or not it was
lawful in point of confidence to dissect a dead body.
In Muinfoy, till very lately, both anatomy and the
use of skeletons were forbidden, the first as inhuman,
and the latter as subversive to witchcraft.

In the beginning of the 16th century, learning re-
ceived considerable in Europe, and particularly physi-
ical, by means of copies of the Greek authors brought from
the library of Constantinople; after which the number of
anatomists and anatomical books increased to a prodig-
gious degree.—The Europeans becoming thus perfec-
ted of the ancient Greek fathers of medicine, were for
a long time so much occupied in correcting the copies
they could obtain, studying the meaning, and com-
menting upon them, that they attempted nothing of
their own, especially in anatomy.

And here the late Dr Hunter introduces into the
annals of this art, a genius of the first rate, Leonardo
da Vinci, who had been formerly overlooked, because
he was of another profession, and because he published
nothing upon the subject. He is considered by the
Doctor as by far the best anatomist and physiologist
of his time, and was certainly the first man we know of
who introduced the practice of making anatomical
drawings.

Vasari, in the lives of the painters, speaks of Leo-

nardo thus, after telling us that he had composed a
book of the anatomy of a horse, for his own study:

"He afterwards applied himself with more diligence
to the human anatomy; in which study he reciprocally
received and communicated assistance to Marc Anto-
nio della Torre, an excellent philosopher, who then
read lectures in Padua, and wrote upon this subject, and
who was the first, as I have heard, who began to il-
lustrate medicine from the doctrine of Galen, and to give
true light to anatomy, which till that time had been
involved in clouds of darkness and ignorance. In this
he availed himself exceedingly of the genius and labour
of Leonardo, who made a book of studies, drawn with
red chalk, and touched with a pen, with great diligence,
of such subjects as he had himself dissected; where he
made all the bones, and to those he joined, in their or-
der, all the nerves, and covered them with the muscles.

And concerning those, from part to part, he wrote
marks in letters of an ugly form, which are written by
the left hand, backwards, and not to be understood but
by those who know the method of reading them; for
they are not to be read without a looking-glass. Of
these papers of the human anatomy, there is a great
part in the possession of M. Francesco da Melzo, a Mi-
lanese-gentleman, who, in the time of Leonardo, was a
most beautiful boy, and much beloved by him, as he is
now a beautiful and genteel old man, who reads those
writings, and carefully preserves them, as precious re-
liefs, together with the portrait of Leonardo, of happy
memory. It appears impossible that that divine spirit
should reason so well upon the arteries, and muscles,
and nerves, and veins; and with such diligence of
every thing, &c. &c."

Those very drawings and the writings are happily
found to be preferred in the Britannic Majesty's great
collection of original drawings, where the Doctor
was permitted to examine them; and his sentiments upon
the occasion he thus expresses: "I expected to see lit-
tle more than such delineings in anatomy, as might be
useful to a painter in his own profession; but I saw,
and indeed with astonishment, that Leonardo had been
a general and a deep student. When I consider what
pains he has taken upon every part of the body, the
superiority of his universal genius, his particular ex-
cellence in mechanics and hydraulics, and the atten-
tion with which such a man would examine and ice
objects which he was to draw, I am fully persuaded
that Leonardo was the best anatomist at that time in the
world. We must give the 16th century the credit of
Leonardo's anatomical studies, as he was 55 years of
age at the close of that century."

In the beginning of the 16th century, Achillins and
Benedictus, but particularly Berengarius and Massa,
followed out the improvement of anatomy in Italy,
where they taught it, and published upon the subject.
These first improvers made some discoveries from
their own dissections; but it is not surprising that they
should have been deficient of themselves, and have
followed Galen almost blindly, when his authority
had been so long established, and when the enthusi-
asm for Greek authors was rising to such a pitch.

Soon after this, we may say about the year 1540,
the great Vesalius appeared. He was industrious, labo-
rious, and ambitious. From Brussels, the place of his
birth, he went to Louvain, and thence to Paris, where
anatomy was not yet making a considerable figure, and
then to Louvain to teach; from which place, very for-
tunately for his reputation, he was called to Italy,
where he met with every opportunity that such a gen-
us for anatomy could desire, that is, books, subjects,
and excellent draughtsmen. He was equally laborious
in reading the ancients, and in dissecting bodies. And
in making the comparison, he could not but see, that
Galen was great room for improvement, and that many
of Galen's descriptions were erroneous. Vesalius,
but a young man, he published a noble system of anat-
omy, illustrated with a great number of elegant fig-
ures.—In this work he found so many occasions of
correcting Galen, that his contemporaries, partial to
antiquity, and jealous of his reputation, complained
that he carried his turn for improvement and critique
to licentiousness. The spirit of opposition and emula-
tion was presently roused; and Sylvins in France, COLUMBUS,
Galen's Fellipus, and Eustachi in Italy, who were all
in high anatomical reputation about the middle of this
16th century, endeavoured to defend Galen at the ex-
pense of Vesalius. In their disputes they made their
appeals to the human body; and thus in a few years
the art was greatly improved. And Vesalius being de-
tected in the very fault which he condemned in Galen,
to wit, describing from the dissections of brutes, and
not of the human body, he exposed so fully that blun-
der of the older anatomists, that in succeeding times
there has been little reason for such complaint. Bes-
ides the above, he published several other anatomical
treatises. He has been particularly serviceable by im-
posing-
posing names on the muscles, most of which are retained to this day. Formerly they were distinguished by numbers, which were differently applied by almost every author.

In 1561, Gabriel Fallopius, professor of anatomy at Padua, published a treatise of anatomy under the title of Observationes Anatomicae. This was designed as a supplement to Vesalius; many of whose descriptions he corrects, though he always makes mention of him in an honourable manner. Fallopius made many great discoveries, and his book is well worth the perusal of every anatomist.

In 1623, Bartholomaeus Eustachius published his Opera Anatomica at Venice, which have ever since been justly admired for the exactness of the descriptions, and the discoveries contained in them. He published afterwards some other pieces, in which there is little of anatomy; but never published the great work he had promised, which was to be adorned with copperplates representing all the parts of the human body. These plates, after lying buried in an old cabinet for upwards of 150 years, were at last discovered and published in the year 1714, by Lancisi the pope's physician; who added a short explication text, because Eustachius's own writing could not be found.

From this time the study of anatomy gradually diffused itself over Europe; infomuch that for the last hundred years it has been daily improving by the labour of a number of professed anatomists almost in every country of Europe.

We may form a judgment about the state of anatomy even in Italy, in the beginning of the 17th century, from the information of Cortesio. He had been professor of anatomy at Bologna, and was then professor of medicine at Massana; where, though he had a great desire to improve himself in the art, and to finish a treatise which he had begun on practical anatomy, in 24 years he could twice only procure an opportunity of dissecting a human body, and then it was with difficulties and in hurry; whereas he had expected to have done so, he says, once every year, according to the custom in the famous academies of Italy.

In the very end of the 16th century, the great Harvey was the custom of the times, went to Italy to study medicine; for Italy was still the favourite seat of the arts: And in the very beginning of the 17th century, soon after Harvey's return to England, his master in anatomy, Fabricius ab Aquapendente, published an account of the valves in the veins, which he had discovered many years before, and no doubt taught in his lectures when Harvey attended him.

This discovery evidently affected the established doctrine of all ages, that the veins carried the blood from the liver to all parts of the body for nourishment. It fet Harvey to work upon the use of the heart and vascular systems in animals; and in the course of some years he was so happy as to discover, and to prove beyond all possibility of doubt, the circulation of the blood. He taught his new doctrine in his lectures about the year 1616, and printed it in 1628.

It was by far the most important step that had been made in the knowledge of animal bodies in any age. It not only reflected useful lights upon what had been already found out in anatomy, but also pointed out the means of further investigation. And accordingly we see, that from Harvey to the present time, anatomy has been so much improved, that we may reasonably question if the ancients have been further outdone by the moderns in any other branch of knowledge. From one day to another there has been a constant succession of discoveries, relating either to the structure or functions of our body; and new anatomical processes, both of investigation and demonstration, have been daily invented. Many parts of the body, which were not known in Harvey's time, have since then been brought to light: and of those which were known, the internal composition and functions remained unexplained; and indeed must have remained unexplicable without the knowledge of the circulation.

Harvey's doctrine at first met with considerable opposition: but in the space of about 20 years it was so generally and so warmly embraced, that it was imagined every thing in phycic would be explained. But time and experience have taught us, that we still are, and probably must long continue to be, very ignorant; and that in the study of the human body, and of its diseases, there will always be an extensive field for the exercise of sagacity.

After the discovery and knowledge of the circulation of the blood, the next question would naturally have been about the passage and route of the nutritious part of the food or chyle from the bowels to the blood-vessels: And, by good fortune, in a few years after Harvey had made his discovery, Aellius, an Italian physician found out the lacteals, or velsels which carry the chyle from the intefines; and printed his account of them, with coloured prints; in the year 1627, the very year before Harvey's book came out.

For a number of years after these two publications, the anatomists in all parts of Europe were daily opening living dogs, either to see the lacteals or to observe the phenomena of the circulation. In making an experiment of this kind, Pecquet in France was fortunate enough to discover the thoracic duct, or common trunk of all the lacteals, which conveys the chyle into the subclavian vein. He printed his discovery in the year 1631. And now the lacteals having been traced from the intefines to the thoracic duct, and that duct having been traced to its termination in a blood-vessel, the passage of the chyle was completely made out.

The same practice of opening living animals furnished occasions of discovering the lymphatic velsels. This good fortune fell to the lot of Rudbec first, a young Swedish anatomist; and then to Thomas Bartholine, a Danish anatomist, who was the first who appeared in print upon the lymphatics. His book came out in the year 1653, that is two years after that of Pecquet. And then it was very evident that they had been seen before by Dr Higmore and others, who had mistaken them for lacteals. But none of the anatomists of those times could make out the origin of the lymphatics, and none of the physiologists could give a satisfactory account of their use.

The circulation of the blood and the passage of the chyle having been satisfactorily traced out in full-grown animals, the anatomists were naturally led next to consider how these animal processes were carried on in the child while in the womb of the mother. Accordingly the male and female organs, the appearances and contents of the pregnant uterus, the incubated egg, and every
every phenomenon which could illustrate generation, became the favourite subject, for about 30 years, with the principal anatomists of Europe.

Thus it would appear to have been in theory: but Dr Hunter believes, that in fact, as Harvey’s master Fabricius laid the foundation for the discovery of the circulation of the blood by teaching him the valves of the veins, and thereby inviting him to consider that subject; so Fabricius by his lectures, and by his elegant work De formatione, et de formatione ovii at pulli, probably made that likewise a favourite subject with Dr Harvey. But whether he took up the subject of generation in consequence of his discovery of the circulation, or was led to it by his renowned master Fabricius, he spent a great deal of his time in the inquiry; and published his observations in a book De generatione animalium, in the year 1657, that is six years before his death.

In a few years after this, Swammerdam, Van Horne, Steno, and De Graaf, excited great attention to the subject of generation, by their supposed discovery that the females of viviparous animals have ovaria, that is, clusters of eggs in their loins, like oviparous animals; which, when impregnated by the male, are conveyed into the uterus: so that a child is produced from an egg as well as a chick; with this difference, that one is hatched within, and the other without, the body of the mother.

Malpighi, a great Italian genius, some time after, made considerable advances upon the subject of generation. He had the good fortune to be the first who used magnifying glasses with address in tracing the first appearances in the formation of animals. He likewise made many other observations and improvements in the minutiae of anatomy by his microscopic labours, and by cultivating comparative anatomy.

This distinguished anatomist gave the first public specimen of his abilities, by printing a dissertation on the lungs anno 1661; a period so remarkable for the study of nature, that it would be injustice to pass it without particular notice.

At the same time flourished Laurentius Bellinus at Florence, and was the first who introduced mathematical reasoning in ph地貌. In 1652, Simon Pauli published a treatise De albando officii. He had long been admired for the white skeletons he prepared; and at last discovered his method, which was by expelling the bones all winter to the weather. Johannes Swammerdam of Amsterdam also published some anatomical treatises; but was most remarkable for his knowledge of preserving the parts of bodies entire for many years, by injecting their vessels. He also published a treatise on respiration; wherein he mentioned his having figures of all the parts of the body as big as the life, cut in copper, which he designed to publish, with a complete system of anatomy. These, however, were never made public by Swammerdam; but in 1659, Gothofridus Bidloo, professor of anatomy at Leyden, published a work entitled Anatomia corporis humani, where all the parts were delineated in very large plates almost as big as the life. Mr Cowper, an English surgeon, bought 300 copies of these figures; and in 1698, published them with an English text, quite different from Bidloo’s Latin one; to which were added letters in Bidloo’s figures, and some few figures of Mr Cowper’s own. To this work Cowper’s name was prefixed, without the least mention of Bidloo, except on purpose to confuse him. Bidloo immediately published a very ill-natured pamphlet, called Guilelmus Cowperus citatort comen tribunalis; appealing to the Royal Society, how far Cowper ought to be punished as a plagiary of the work kind, and endeavouring to prove him an ignorant deceitful fellow. Cowper answered him in his own style, in a pamphlet called his Vindiciae; endeavouring to prove, either that Bidloo did not understand his own tables, or that they were none of his. It was even alleged that those were the tables promis- 2 by Swammerdam, and which Bidloo had got from his widow. This, however, appears to have been only an invicious furnile, there being unquestionable evidence that they were really the performance of Bidloo.

Soon after, Iifbrandi Diembroeck, professor of anatomy at Utrecht, began to appear as an author. His work contained very little original; but he was at great pains to collect from others whatever was valuable in their writings, and his system was the common standard among anatomical students for many years.

About the same time, Antonius Liewenhoweck of Delft, improved considerably on Malpighi’s use of microscopes. These two authors took up anatomy where others had dropt it; and, by this new art, they brought a number of amazing things to light. They discovered the red globules of the blood; they were enabled to see the actual circulation of the blood in the transparent parts of living animals, and could measure the velocity of its motion; they discovered that the arteries and veins had no intermediate cells or spongy substance, as Harvey and all the preceding anatomists had supposed, but communicated one with the other by a continuation of the same tube.

Liewenhoweck was in great fam ebook for his discovery of the animalcules in the semen. Indeed there was scarcely a part of the body, solid or fluid, which escaped his examination; and he almost everywhere found, that what appeared to the naked eye to be rude undigested matter, was in reality a beautiful and regular compound.

After this period, Nuck added to our knowledge of the absorbent system already mentioned, by his injections of the lymphatic glands; Ray, by his description of the valves of the lymphatic vessels; and Dr Meckel, by his accurate account of the whole system, and by tracing those vessels in many parts where they had not before been described.

Befides these authors, Drs Hunter and Monro have called the attention of the public to this part of anatomy, in their controversy concerning the discovery of the office of the lymphatics. When the lymphatic vessels were first seen and traced into the thoracic duct, it was natural for anatomists to suppose, that as the lacteals absorbed from the cavity of the intestines, the lymphatics, which are similar in figure and structure, might possibly do the same office with respect to other parts of the body: and accordingly, Dr Gilfoyle, who wrote in 1654, supposed these vessels arose from cavities, and that their use was to absorb; and Frederic Hoffman has very explicitly laid down the doctrine of the lymphatic vessels being a system of absorbents. But anatomists in general have been of a contrary opinion; for, from experiments, particularly
particularly such as were made by injections, they have been persuaded that the lymphatic vessels did not arise from cavities, and did not absorb, but were merely continuations from small arteries. The doctrine, therefore, that the lymphatics, like the lacccals, were abortibrants, as had been suggested by Gilioli and by Hoff- man, has been revived by Dr Hunter and Dr Monro, who have controverted the experiments of their predecessors in anatomy, and have endeavored to prove that the lymphatic vessels are not continued from arteries, but are abortibrants.

To this doctrine, however, several objections have been started, particularly by Haller (Elem. Phys. l. 24. § 2, 3.), and it has been found, that before the doctrine of the lymphatics being a system of abortibrants can be established, it must first be determined whether this system is to be found in other animals besides man and quadrupeds. Mr. Hewson claims the merit of having proved the affirmative of this question, by discovering the lymphatic system in birds, fish, and amphibious animals. See Phil. Trans. vol. viii. and xix.

And latterly, Mr. Cruikshank has traced the ramifications of this system in almost every part of the body; and from his dissections, figures have been made and lately published to the world. To Mr. Sheldon also we are much indebted for his illustration of this system, which promises to give great satisfaction, but of which only a part has yet been published.

The gravid uterus is a subject likewise which has received considerable improvements, particularly relating to one very important discovery; viz. that the internal membrane of the uterus, which Dr. Hunter has named decidua, constitutes the exterior part of the fecondines or after-birth, and separates from the rest of the uterus every time that a woman either bears a child or suffers a miscarriage. This discovery includes another, to wit, that the placenta is partly made up of an excrescence or efflorescence from the uterus itself.

These discoveries are of the utmost consequence, both in the physiological question about the connection between the mother and child, and wife in explaining the phenomena of births and abortions, as well as in regulating obstetrical practice.

The anatomists of this century have improved anatomy, and have made the study of it much more easy, by giving us more correct as well as more numerous figures. It is amazing to think of what has been done in that time. We have had four large folio books of figures of the bones, viz. Cheffelden's, Albinus's, Sue's and Trew's. Of the muscles, we have had two large folio's, one from Cowper, which is elegant; and one from Albinus, which, from the accuracy and labour of the work, may suppose will never be outdone. Of the blood-veins we have a large folio from Dr. Haller. We have had one upon the nerves from Dr. Meckel, and another by Dr. Monro junior. We have had Albinus's, Roederer's, Jenty's, and Hunter's works upon the pregnant uterus; Wibritche and Leber on the joints and fresh bones; Sommerring on the brain; Zin on the eye; Cotannius, Mekel junior, &c. on the ear; Walterus on the nerves of the thorax and abdomen; Dr. Monro on the bowels mucous, &c.

It would be endless to mention the anatomical figures that have been published in this century, of particular and smaller parts of the body, by Morgagni, Ruyfch, Val- salva, Sandorini, Heüter, Vater, Cant, Zimmerman, Walterus, and others.

Those elegant plates of the brain, however, just published by M. Vieq. d' Azyr, must not pass without notice, especially as they form part of an universal system of anatomy and physiology, both human and comparative, proposed to be executed in the same splendid style. Upon the brain alone 19 folio plates are employed; of which several are coloured. The figures are delineated with accuracy and cleanliness; but the colouring is rather beautiful than correct. Such parts of this work as may be published, cannot fail to be equally acceptable to the anatomist and the philosopher; but the entire design is apparently too extensive to be accomplished within the period of a single life. In Great Britain, also, a very great anatomical work is carrying on by Andrew Bell, F. S. A. S. engraver to his Royal Highness the Prince of Wales, with the approbation of Dr. Monro, and under the inspection of his very ingenious assistant, My Fyfe. It is to compose a complete illustration, both general and particular, of the human body, by a selection from the best plates of all the greatest anatomists, as well foreign as British, exhibiting the latest discoveries in the science, and accompanied with copious explanations. The whole number of plates mentioned in the Prospectus is 240, of which 152 are already done; all in royal folio.

To the foreign treatises already mentioned may be added those recently published by Sabattier and Plencel on anatomy in general. In Great Britain, the writings of Keil, Douglas, Cheffelden, the first Monro, Winlow, &c. are too well known to need description. The list of these useful as a standard for the students of anatomy; but it has of late given place to a more accurate and comprehensive system, in three volumes, published by Mr. Elliot of Edinburgh, upon a plan approved of by Dr. Monro, and executed by My Fyfe. Dr. Simmons of London has also obliged the world with an excellent system of anatomy; and another work, under the title of "Elements of Anatomy and the Animal Oeconomy" in which the subjects are treated with uncommon elegance and perspicuity.

In the latter part of the last century, anatomy made two great steps, by the invention of injections, and the method of making what we commonly call preparations. These two modern arts have really been of infinite use to anatomy; and besides have introduced an elegance into our administrations, which in former times could not have been supposed to be possible. They arose in Holland under Swammerdam and Ruyfch, and afterwards in England under Cowper, St Andrè, and others, where they have been greatly improved.

The anatomists of former ages had no other knowledge of the blood-veins, than what they were able to collect from laborious dissections, and from examining the smaller branches of them, upon some lucky occasion, when they were found more than commonly loaded with red blood. But filling the vascular system with a bright coloured wax, enables us to trace the large veins with great ease, renders the smaller more conspicuous, and makes thousands of the very minute
Introd.

**ANATOMY.**

ones visible, which from their delicacy, and the transparency of their natural contents, are otherwise imperceptible.

The modern art of corrodling the fleshy parts with a men[trenum, and of leaving the moulded wax entire, is so exceedingly useful, and at the same time so fundamental, that it does great honour to the ingenious inventor Dr. Nicholls.

The wax-work art of the moderns might deserve notice in any history of anatomy, if the masons in that way had not been so careless in their imitation. Many of the wax-figures are so tawdry with a show of unnatural colours, and so very incorrect in the circumstances of figure, situation, and the like, that though they strike a vulgar eye with admiration, they must appear ridiculous to an anatomist. But those figures which are cast in wax, plaster or lead, from the real subject, and of which late years have been frequently made, are, of course, very correct in all the principal parts, and may be considered as no insignificant acquisition to modern anatomy. The proper, or principal use of this art is, to preserve a very perfect likeness of such subjects as we but seldom can meet with, or cannot well preserve in a natural state; a subject in pregnancy for example.

The modern improved methods of preserving animal bodies, or parts of them, has been of the greatest service to anatomy; especially in saving the time and labour of the anatomist in the nicer dissections of the small parts of the body. For now, whatever he has prepared with care, he can preserve; and the object is ready to be seen at any time. And in the same manner he can preserve anatomical curiosities, or rarities of every kind; such as, parts that are uncommonly formed; parts that are disfigured; the parts of the pregnant uterus and its contents. Large collections of such curiosities, which modern anatomists are striving almost everywhere to procure, are of infinite service to the art, especially in the hands of teachers. They give students clear ideas about many things which it is very essential to know, and yet which it is impossible that a teacher should be able to show otherwise, were he ever so well supplied with fresh subjects.

§ 2. View of the Subject in General, and Plan of the following Treatise.

The etymology of the word anatomy, as above given, implies simply *dissection*; but by this term something more is usually understood.

It is every day made use of to express a knowledge of the human body; and a person who is said to understand anatomy, is supposed to be conversant with the structure and arrangement of the different solid parts of the body.

It is commonly divided into Anatomy, properly so called; and Comparative Anatomy: the first of these is confined solely to the human body; the latter includes all animals, so far as a knowledge of their structure may tend to perfect our ideas of the human body. See Comparative Anatomy.

The term anatomy may also have another and more extensive signification: it may be employed to express not only a knowledge of the structure and disposition of the parts, but likewise of their economy and use. Considered in this light, it will seldom fail to excite the curiosity of people of taste, as a branch of philosophy; since, if it is pleasing to be acquainted with the structure of the body, it is certainly more so to discover all the springs which give life and motion to the machine, and to observe the admirable mechanism by which so many different functions are executed without any concern those who are to be the guardians of health, as this study is necessary to lay a foundation for all the branches of medicine. The more we know of our fabric, the more reason we have to believe, that if our senses were more acute, and our judgment more enlarged,
ANATOMY.

In order to acquire a satisfactory general idea of this subject, and find a solution of all such questions, let us, in our imaginations, make a man: in other words let us suppose that the mind, or immaterial part, is to be placed in a corporeal fabric, in order to hold a correspondence with other material beings by the intervention of the body; and then consider, a priori, what will be wanted for her accommodation. In this inquiry, we shall plainly see the necessity or advantage, and therefore the final cause, of most of the parts which we actually find in the human body. And if we consider that, in order to answer some of the requisites, human wit and invention would be very insufficient; we need not be surprised if we meet with some parts of the body whose use we cannot yet perceive, and with some operations and functions which we cannot explain. We can see that the whole bears the most striking characters of excelling wisdom and ingenuity: but the imperfect tenets and capacity of man cannot pretend to reach every part of a machine, which nothing less than the intelligence and power of the Supreme Being could contrive and execute.

First, then, the mind, the thinking, immaterial agent, must be provided with a place of immediate residence, which shall have all the requisites for the union of spirit and body; accordingly she is provided with the brain, where she dwells as governor and superintendent of the whole fabric.

In the next place, as she is to hold a correspondence with all the material beings around her, she must be supplied with organs fitted to receive the different kinds of impressions which they will make. In fact, therefore, we see that she is provided with the organs of sense, as we call them: the eye is adapted to light; the ear to sound; the nose to smell; the mouth to taste; and the skin to touch.

Further: She must be furnished with organs of communication between herself in the brain and those organs of sense, to give her information of all the impressions that are made upon them: and she must have organs between herself in the brain and every other part of the body, fitted to convey her commands and influence over the whole. For these purposes the nerves are actually given. They are chords, which rise from the brain, the immediate residence of the mind, and diffuse themselves in branches through all parts of the body. They convey all the different kinds of sensations to the mind, in the brain; and likewise carry out from thence all her commands and influence to the other parts of the body. They are intended to be occasional monitors against all such impressions as might endanger the well-being of the whole, or of any particular part; which vindicates the Creator of all things, in having actually subjected us to those many disagreeable and painful sensations which we are exposed to from a thousand accidents in life.

Moreover, the mind, in this corporeal system, must be endued with the power of moving from place to place, that she may have intercourse with a variety of objects; that she may fly from such as are disagreeable, dangerous or hurtful, and pursue such as are pleasant or useful to her. And accordingly she is furnished with limbs, and with muscles and tendons, the instruments of motion, which are found in every part of the fabric where motion is necessary.

But to support, to give firmness and shape to the fabric; to keep the looser parts in their proper places; to give fixed points for, and the proper direction to its motions, as well as to protect some of the more important and tender organs from external injuries: there

(a) The following beautiful representation is taken from the late Dr Hunter's Introductory Lecture in Anatomy.
there must be some firm prop-work interwoven througout the whole. And, in fact, for such purposes the bones are given.

The prop-work must not be made into one rigid fabric, for that would prevent motion. Therefore there are a number of bones.

These pieces must all be firmly bound together, to prevent their dislocation. And this end is well answered by the ligaments.

The extremities of these bony pieces, where they move and rub upon one another, must have smooth and slippery surfaces for easy motion. This is most happily provided for, by the cartilages and mucus of the joints.

The interfaces of all these parts must be filled up with some soft and ductile matter, which shall keep them in their places, unite them, and at the same time allow them to move a little upon one another. And these purposes are answered by the cellular membrane or adipofe substance.

There must be an outward covering over the whole apparatus, both to give it compactness and to defend it from a thousand injuries: which, in fact, are the very purposes of the skin and other integuments.

Lastly, the mind being formed for society and intercourse with beings of her own kind, she must be endued with powers of expressing and communicating her thoughts by some sensible marks or signs; which shall be both easy to herself, and admit of great variety; and accordingly she is provided with the organs and faculty of speech, by which she can throw out signs with amazing facility, and vary them without end.

Thus we have built up an animal body which would seem to be pretty complete; but as it is the nature of matter to be altered and worked upon by matter; so in a very little time such a living creature must be destroyed, if there is no provision for repairing the injuries which she must commit upon herself, and those which she must expose to from without. Therefore a treasure of blood is actually provided in the heart and vaso-vascular system, full of nutritious and healing particles, fluid enough to penetrate into the minutest parts of the animal; impelled by the heart, and conveyed by the arteries, it washes every part, builds up what was broken down, and sweeps away the old and useless materials. Hence we see the necessity or advantage of the heart and arterial system.

What more there was of this blood than enough to repair the present damages of the machine, must not be lost, but should be returned again to the heart; and for this purpose the venous system is actually provided. These requires in the animal explain, a priori, the circulation of the blood.

The old materials which were become useless, and are swept off by the current of blood, must be separated and thrown out of the system. Therefore glands, the organs of secretion, are given for straining whatever is redundant, vapid, or noxious, from the mafs of blood; and when strained, they are thrown out by emunctories, called organs or excretion.

But now, as the machine must be constantly wearing, the repair must be carried on without intermission, and the strainers must always be employed. Therefore there is actually a perpetual circulation of the blood, and the secretions are always going on.

Even all this provision, however, would not be sufficient: for that store of blood would soon be consumed, and the fabric would break down, if there were not a provision made for fresh supplies. These we observe, in fact, are profusely scattered round her in the animal and vegetable kingdoms; and she is furnished with hands, the fittest instruments that could have been contrived, for gathering them, and for preparing them in a variety of ways for the mouth.

But these supplies, which we call food, must be considerably changed; they must be converted into blood. Therefore she is provided with teeth for cutting and bruising the food, and with a stomach for melting it down: in short, with all the organs subservient to digestion. — The finer parts of the aliment only can be useful in the constitution: these must be taken up and conveyed into the blood, and the dregs must be thrown off. With this view the intestinal canal is actually given. It separates the nutritious part, which we call chyle, to be conveyed into the blood by the system of absorbent vessels; and the faces pass downwards, to be conducted out of the body.

Now we have got our animal not only furnished with what is wanted for its immediate existence, but also with the powers of protracting that existence to an infinite length of time. But its duration, we may presume, must necessarily be limited; for as it is nourished, grows, and is raised up to its full strength and utmost perfection; so it must, in time, in common with all material beings, begin to decay, and then hurry on to final ruin. Hence we see the necessity of a scheme for renovation. Accordingly wise Providence, to perpetuate, as well as preserve his work, besides giving a strong appetite for life and self-preservation, has made animals male and female, and given them such organs and passions as will secure the propagation of the species to the end of time. —

Thus we see, that by the very imperfect survey which human reason is able to take of this subject, the animal man must necessarily be complex in his corporeal system, and in its operations.

He must have one great and general system, the vascular, branching through the whole for circulation: Another, the nervous, with its appendages the organs of sense, for every kind of feeling: And a third, for the union and connection of all those parts.

Besides these primary and general systems, he requires others which may be more local or confined: One for strength, support, and protection; the bony compages: Another for the requisite motions of the parts among themselves, as well as from moving from place to place; the muscular part of the body: Another to prepare nourishment for the daily recruit of the body: the digestive organs: And one for propagating the species: the organs of generation.

And in taking this general survey of what would appear, a priori, to be necessary for adapting an animal to the situations of life, we observe, with great satisfaction, that man is accordingly made of such systems, and for such purposes. He has them all; and he has nothing more, except the organs of respiration. Breathing it seemed difficult to account for a priori: we only knew it to be in fact essentially necessary to life. Norwithstanding this, when we saw all the other parts of the body, and their functions, to well ac-
counted for, and so wisely adapted to their several purposes, there could be no doubt that respiration was so likewise: And accordingly, the discoveries of Dr Priestley have lately thrown light upon this function also, as will be shown in its proper place.

Of all the different systems in the human body, the use and necessity are not more apparent, than the wisdom and contrivance which has been exerted in putting them all into the most compact and convenient form: in dividing them so, that they shall mutually receive, and give help to one another; and that all, or many of the parts, shall not only answer their principal end or purpose, but operate successfully and usefully in a variety of secondary ways.

If we consider the whole animal machine in this light, and compare it with any machine in which human art has exerted its utmost; suppose the best constructed ship that ever was built, we shall be convinced beyond the possibility of doubt, that there are intelligence and power far far surpassing what humanity can boast of.

One superiority in the natural machine is peculiarly striking.—In machines of human contrivance or art, there is no internal power, no principle in the machine itself, by which it can alter and accommodate itself to any injury which it may suffer, or make up any injury which admits of repair. But in the natural machine, the animal body, this is most wonderfully provided for by internal powers in the machine itself; many of which are not more certain and obvious in their effects, than they are above all human comprehension as to the manner and means of their operation. Thus, a wound heals up of itself; a broken bone is made firm again by a callus; a dead part is separated and thrown off; noxious juices are driven out by some of the emunctories; a redundancy is removed by some spontaneous bleeding; a bleeding naturally stops of itself; and a great loss of blood, from any cause, is in some measure compensated, by a contracting power in the vascular system, which accommodates the capacity of the vessels to the quantity contained. The stomach gives information when the supplies have been expended; represents, with great exactness, the quantity and the quality of what is wanted in the present state of the machine; and in proportion as the meets with neglect, riles in her demand, urges her petition in a louder tone, and with more forcible arguments. For its protection, an animal body refits heat and cold in a very wonderful manner, and prefers an equal temperature in a burning and in a freezing atmosphere.

A farther excellence or superiority in the natural machine, if possible, still more astonishing, more beyond all human comprehension, than what we have been speaking of, is the following. Besides those internal powers of self-preservation in each individual, when two of them co-operate, or act in concert, they are endowed with powers of making other animals or machines like themselves, which again are possessed of the same powers of producing others, and so of multiplying the species without end.

There are powers which mock all human invention or limitation. They are characteristics of the divine Architect.

Having promised this general account of the subject, we shall next consider the method to be observed in treating it.

The study of the human body, as already noticed, is commonly divided into two parts. The first, which is called Anatomy, relates to the matter and structure of its parts; the second, Physiology and Animal economy, relates to the principles and laws of its internal operations and functions.

As the body is a compound of solids and fluids, Anatomy is divided into,

1. The Anatomy of the solids, and
2. The Anatomy of the fluids.

I. The Solids, by which we mean all parts of our body which are not fluid, are generally divided into two classes, viz.

1. The hard solids or bones. This part of anatomy is called Osteology; which signifies the doctrine of the bones.
2. The softer solids; which part is called Sarcology, viz. the doctrine of flesh.

This division of the solids, we may observe, has probably taken its origin from the vulgar observation, that the body is made of bone and flesh. And as there are many different kinds of what are called soft or fleshly parts, Sarcology is subdivided into,

1. Angiology, or the doctrine of vessels: by which is commonly understood blood-vessels:
2. Adenology, or glands:
3. Neurology, or nerves:
4. Myology, or muscles: and,
5. Splanchonology, of the visera or bowels. There is, besides, that part which treats of the organs of sense and of the integuments.

This division of the solids has been here mentioned, rather for the sake of explaining so many words, which are constantly used by anatomists, than for its importance or accuracy. For besides many other objections that might be urged, there are in the body three species of solids, viz. gristle or cartilage, hair, and nails; which are of an intermediate nature between bone and flesh; and therefore cannot so properly be brought into the osteology or the sarcology. The cartilages were classified with the bones; because the greatest number of them are appendages to bones: and for the like reason the hair and the nails were classified with the integuments.

II. The Fluids of the human body may be divided into three kinds, which Dr Hunter calls the crude, the general or perfect, and the local or secreted fluid.

1. By the crude fluid is meant the chyle, and whatever is absorbed at the surfaces of the body; in other words, what is recently taken into the body, and is not yet mixed with or converted into blood.
2. The general or perfect fluid is the blood itself; to wit, what is contained in the heart, arteries, and veins, and is going on in the round of the circulation.
3. The local or secreted, are those fluids peculiar to particular parts of the body, which are strained off from the blood, and yet are very different in their properties from the blood. They are commonly called secretions; and some are useful, others excretions.

In treating of the Physiology, it is very difficult to say what plan should be followed; for every method which has been yet proposed, is attended with manifest in-convenience.
convenience. The powers and operations of the machine have such a dependence upon one another, such connections and reciprocal influence, that they cannot well be underfloor or explained separately. In this sense our body may be compared to a circular chain of powers, in which nothing is first or last, nothing solitary or independent; so that wherever we begin, we find that there is something preceding which we ought to have known. If we begin with the brain and the nerves, for example, we shall find that these cannot exist, even in idea, without the heart: if we set out with the heart and vascular system, we shall presently be sensible, that the brain and nerves must be supposed; or, should we take up the mouth, and follow the course of the aliment, we should see that the very first organ which presented itself, supposed the existence of both the heart and brain: Wherefore we shall incorporate the Physiology with the Anatomy, by attempting to explain the functions after we have demonstrated the organs.

PART I. OSTEOLoGY.

We begin with the bones, which may be considered as the great support of the body, tending to give it shape and firmness. But before we enter into the detail of each particular bone, it will be necessary to describe their composition and connections, and to explain the nature of the different parts which have an immediate relation to them; as the cartilages, ligaments, periosteum, marrow, and synovial glands.

Sect. I. Of the Bones in general, with their Appendages, &c.

The bones are of a firm and hard (a) substance, of a white colour, and perfectly inelastic. They are the most compact and solid parts of the body, and serve for the attachment and support of all the other parts.

Three different substances are usually distinguished in them; their exterior or bony part, properly so called; their spongy cells; and their reticular substance. The first of these is formed of many laminae or plates, composing a firm hard substance — the spongy or cellular part is so called on account of its resemblance to a sponge, from the little cells which compose it. This substance forms almost the whole of the extremities of cylindrical bones. The reticular part is composed of fibres, which cross each other in different directions. This net-work forms the internal surface of these bones which have cavities.

The flat bones, as those of the head, are composed only of the laminae and the cellular substance. This last is usually found in the middle of the bone dividing it into two plates, and is there called diplás.

Gagliardi, who pretended to have discovered an infinite number of clavicles (c), or bony processes, which he describes as traversing the laminae to unite them together, has endeavoured to support this pretended discovery by the analogy of bones to the bark of trees, in which certain woody nails have been remarked; but this opinion seems to be altogether fanciful.

Some writers have supposed, that the bones are formed by layers of the periosteum, which gradually ossify, in the same manner as the timber is formed in trees by the hardening of the white substance that is found between the inner bark and the wood. M. Duhamel, who has adopted this opinion, fed different animals with madder and their ordinary food alternately during a certain time; and he affirms, that in digesting their bones, he constantly observed distinct layers of red and white, which corresponded with the length of time they had lived on madder or their usual aliment. But it has since been proved by Dextoff, that M. Duhamel's experiments were inaccurate, and that neither the periosteum nor the cartilages are tinged by the use of the madder, which is known to affect the bones only.

We usually consider in a bone, its body and its extremities. The ancients gave the name of diaphysis to the body or middle part, and divided the extremities into apophyses and epiphyses. An apophysis, or process, as it is more commonly called, is an eminence continued from the body of the bone, whereas an epiphysis is at first a sort of appendage to the bone, by means of an intermediate cartilage. Many epiphyses, which appear as distinct bones in the foetus, afterwards become apophyses; for they are at length so completely united to the body of the bone as not to be distinguishable from it in the adult state. It is not unusual, however, at the age of 18 and even 20 years, to find the extremities of bones still in the state of epiphysis.

The names given to the processes of bones are expressive of their shape, size, or use; thus if a process is large and of a spherical form, it is called capitulum; or head; if the head is flattened, it is termed condyle.

Some processes, from their resemblance to a filletto, a breast, or the beak of a crow, are called styloid, unguis, or coracid; others are styled ridges or spines. The two processes of the os femoris derive their name of trochanters from their use.

A bone has its cavities as well as processes. These cavities either extend quite through its substance, or appear only as depressions. The former are called foramina or holes, and these foramina are sometimes termed canalis or conductus, according to their form and extent. Of the depressions, some are useful in articulation. These are called cotylus when they are deep, as is the case with the os innominatum, where it receives the head of the os femoris; or glenoid when they are superficial, as in the acapula, where it receives the os humeri. Of the depressions that are not designed for

(a) Mr Scheele has lately discoveryed that bones contain the phosphoric acid united with calcareous earth, and that to this combination they owe their firmness.

(c) In his Anat. Officium nov. invent. illustrat. he describes four kinds of these clavicles or nails, viz. the perpendicular, oblique, headed, and crooked.
for articulation, those which have small apertures are called synovial; others that are large, and not equally surrounded by high brims, are styled fossa; such as are long and narrow, furrows; or if broad and superficial without brims, synoviosities. Some are called digital impressions, from their resemblance to the traces of a finger on foot bodies.

We shall abridge this article, which is exceedingly diffuse in the generality of anatomical books, and will endeavour to describe it with all the clearness it will allow.

The bones composing the skeleton are so constructed, that the end of every bone is perfectly adapted to the extremity of that with which it is connected, and this construction forms what is called their articulation.

Articulation is divided into diarthrosis, synarthrosis, and amphiarthrosis, or moveable, immovable, and mixed articulation. Each of the two first has its subdivisions. Thus the Diarthrosis, or moveable articulation, includes 1. The enarthrosis, as it is called, when a large head is admitted into a deep cavity, as in the articulation of the os femoris with the os innominatum. 2. Artrodia, when a round head is articulated with a superficial cavity, as in the case of the os humeri and scapula. 3. Ginglimus, or hinge-like articulation, as in the connection of the thigh bone with the tibia. The enarthrosis and artrodia allow of motion to all sides; the ginglimus only of flexion and extension.

The Synarthrosis, or immovable articulation, includes, 1. The future, when the two bones are interdigitated into each other, as is the case with the patellar bones. 2. Gomphosis, when one bone is fixed into another, in the manner the teeth are placed in their sockets.

The term amphiarthrosis is applied to those articulations which partake both of the synarthrosis and diarthrosis, as is the case with the bones of the vertebras, which are capable of motion in a certain degree, although they are firmly connected together by intermediate cartilages.

What is called symphys is the union of two bones into one; as in the lower jaw, for instance, which in the fetus consists of two distinct bones, but becomes one in a more advanced age, by the ossification of the uniting cartilage.

When bones are thus joined by the means of cartilages, the union is styled synchondrosis; when by ligaments, synereusis.

Cartilages are white, solid, smooth, and elastic substances, between the hardness of bones and ligaments, and seemingly of a fibrous texture. We are not able to trace any vessels into their substance by injection, nor are they ever found tinged in animals that have been fed with madder.

They may be distinguished into, 1st, Those which are connected with the bones; and, 2dly, Those which belong to other parts of the body. The first serve either to cover the ends and cavities of bones intended for motion, as in the articulations, where by their smoothness they facilitate motions, which the bones alone could not execute with so much freedom; or they serve to unite bones together, as in the emphysema pubis, or to lengthen them, as in the ribs.

Many of them ossifying as we advance in life, their number is less in the adult than in the fetus, and of course there are fewer bones in the old than in the young subject.

Of the second class of cartilages, or those belonging to the soft parts, we have instances in the larynx, where we find them useful in the formation of the voice, and for the attachment of muscles.

The periosteum is a fine membrane of a compact cellular texture, reflected from one joint to another, and serving as a common covering to the bones. It has sanguiferous and lymphatic vessels, and is supplied with nerves from the neighbouring parts. It adheres very firmly to their surface, and by its smoothness facilitates the motion of muscles. It likewise supports the vessels that go to be distributed through the substance of the bones, and may serve to strengthen the articulations.

At the extremities of bones, where it is found covering a cartilage, it has by some been improperly considered as a distinct membrane, and named perichondrium. This, in its use and structure, resembles the periosteum. Where it covers the bones of the skull, it has gotten the name of perieranium.

The periosteum is not a production of the dura mater, as the ancients, and after them Havers, imagined; nor are the bones formed by the ossification of this membrane, at least when it is in a found state, as some late writers have supposed.

The periosteum is deficient in the teeth above the sockets, and in those parts of bones to which ligaments or tendons are attached.

The marrow is a fat oily substance, filling the cavities of bones. In the great cavities of long bones it is a matter of controversy, whether the marrow is spongy or not. We are certainly not able to trace any nerves to it; and from this circumstance, and its analogy to fat, Haller has ventured to consider it as insensible. On the other hand, Duvverney afferts, that...
that an injury done to this sub stance in a living animal was attended with great pain. In this dispute physiologists do not seem to have sufficiently discriminated between the marrow itself and the membranous cells in which it is contained. The former, like the fat, being nothing more than a secreted, and of course an inorganized, matter, may with propriety be ranked among the insensible parts, as much as intimated mucus or any other secreted matter in the body; whereas the mem brana medullaris being vascu lar, though it possesses but an obscure degree of feeling in a found state, is not perfectly insensible.

The marrow was formerly supposed to be intended for the nourishment and renewal of the bones; but this doctrine is now pretty generally and deservedly exploded. It seems probable that the marrow is to the bones what fat is to the soft parts. They both serve for some important purposes in the animal econ omy; but their particular use has never yet been clearly ascertained. The marrow, from the transudation of the oil through the bones of a skeleton, is supposed to diminish their brittleness; and Havers, who has written professedly on the bones, describes the canals by which the marrow is conveyed through every part of their substance, and divides them into longitudinal and transverse ones. He speaks of the first as extending through the whole length of the bone, and of the latter, as the passage by which the longitudinal ones communicate with each other. The similarity of these to the large canals in burnt bones, and the transudation of the oil through the bones of the skeleton, seems to prove that some such passages do actually exist.

The synovial glands are small bodies (n), sup posed to be of a glandular structure, and exceedingly vascular, secreting a fluid of a clear mucilaginous nature, which serves to lubricate the joints. They are placed in small cavities in the articulations, so as to be capable of being gently compressed by the motion of the joint, which expresses its juice in proportion to the degree of friction. When the synovia is wanting, or is too thick a consistence, the joint becomes stiff and incapable of flexion or extens ion. This is what is termed ankylosis.

Ligaments are white, glistening, inelastic bands, of a compact substance, more or less broad or thick, and serving to connect the bones together. They are distinguished by different names adapted to their different forms and uses. Those of the joints are called either round or capsular. The round ligaments are white, tendinous, and inelastic. They are strong and flexible, and are found only in the joint of the knee, and in the articulation of the os femoris with the os innominatum. The capsular, or capsular ligaments, surround the whole joint like a puree, and are to be found in the articulations which allow motion every way, as in the articulation of the arm with the scapula.

Of those cases called Burse mucosae, a few were known to former anatomists, but by much the greater number have been since discovered by Dr Monro (x), who observes, that they are to be met with in the ex tremities of the body only; that many of them are placed entirely on the inner sides of the tendons, between thse and the bones. Many others cover not only the inner, but the outer sides of the tendons, or are interposed between the tendons and external parts, as well as between those and the bones.

Some are situated between the tendons and external parts only or chiefly, some between contiguous tendons, or between the tendons or the ligaments and the joints. A few such cases are observed where the processes of bones play upon the ligaments, or where one bone plays upon another. Where two or more tendons are contiguous, and afterwards separate from each other, we generally find a common burse divided into branches, with which it communicates; and a few burseae of contiguous tendons communicate with each other.

Some, in healthy children communicate with the cavities of the joints; and in many old people he has seen such communications formed by use or worn by friction, independent of disease.

Their proper membrane is thin and transparent, but very dense, and capable of confining air or any other fluid. It is joined to the neighbouring parts by the common cellular substance. Between the burse and the hard substance of bone, a thin layer of cartilage or tough membrane is very generally interposed. To the cellular substance on the outside of the burse, the adipose substance is connected; except where the burse covers a tendon, cartilage, or bone, much exposed to pressure or friction.

In several places a mass of fat, covered with the continuation of the membrane of the burse, projects into its cavity. The edges of this are divided into fringes.

The inner side of the membrane is smooth, and is extremely slippery from the liquor secreted in it.

The structure of the burse bears a strong resemblance to the capsular ligaments of the joints. 1. The inner layer of the ligament, like that of the burse, is thin and dense. 2. It is connected to the external ligaments by the common cellular substance. 3. Between it and the bones, layers of cartilage, or the articular cartilages, are interposed. 4. At the sides of the joints, where it is not subjected to violent pressure and friction, the adipose substance is connected with the cellular membrane.

Within the cavities of the joints we observe masses of fat projecting, covered with similar blood-vei fels, and with similar sinews hanging from their edges. 6. In the knee the upper part of such a mass of fat forms what has been called the mucilaginous gland of the joint, and the under part projects into the burse behind the ligament which ties the patella to the tibia. 7. The liquor which lubricates the burse has the same colour, consistence, and properties as that of the joints, and both are affected in the same manner by heat, mineral acids, and ardent spirits. 8. In some places the burse constantly communicate with the cavities of the joints, in others they generally do so; from which we may infer a fameness of structure.

When we examine the sinews common to the fatty bodies of the joints and burseae, and which have been supposed to be the ducts of glands lodged within the

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(n) It is now much doubted, however, whether the appearances in the joints, which are usually called glands, are any thing more than assemblages of fat.

(x) See Description of the Burse Mucosae, &c.
ANATOMY.

Part I.

These bones are all harder at their surface than in bone; and on this account they are divided into two tables, and a middle spongy substance called diploe.

In this, as in all the other bones, we shall consider of the OSE-

s its figure, structure, processes, depressions, and cavities; and the manner in which it is articulated with the other bones.

The os frontis has some resemblance in shape to the shell of the cockle. Externally it is convex, its concave side being turned towards the brain. This bone in the places where it is united to the temporal bones, is very thin, and has there no diploe. It is likewise exceedingly thin in that part of the orbit of the eye which is nearest to the nose. Hence it is, that a wound in the eye, by a sword or any other pointed instrument, is sometimes productive of immediate death.

In these cases, the sword passing through the weak part of the bone, penetrates the brain, and divides the nerves at their origin; or perhaps opens some blood-vessel, the consequences of which are soon fatal.

We observe on the exterior surface of this bone five apophyses or processes, which are easily to be distinguished. One of these is placed at the bottom and narrowest part of the bone, and is called the nasal process, from its supporting the upper end of the bones of the nose. The four others are called angular or orbitar processes. They assist to form the orbits, which are the cavities on which the eyes are placed. In each of these orbits there are two processes, one at the interior or great angle, and the other at the exterior or little angle of the orbit. They are called the angular processes. Between these a ridge is extended in form of an arch, and on this the eye-brows are placed. It is called the orbitar or superciliary ridge, and in some measure covers and defends the globe of the eye. There is a hole in this for the passage of the frontal vessels and nerves. This arch is interrupted near the nose by a small pit, in which the tendon of the muscleus obliquus major of the eye is fixed. From the under part of each superciliary ridge a thin plate runs a considerable way backwards, and has the name of orbitar; the external and fore-part of this plate forms a finity for lodging the lacrymal gland. Between the orbitar plates there is a large disconnection of the bone, which is filled up by the cribiform part of the os ethmoidei.

On examining the inner surface of this bone at its under and middle part, we observe an elevation in form of a ridge, which has been called the simbra processus; it ascends for some way, dividing the bone into two considerable fossae, in which the anterior lobes of the brain are placed. To a narrow furrow in this ridge is attached the extremity of the falx, as the membrane is called, which divides the brain into two hemispheres. The furrow becoming gradually wider, is continued to the upper and back part of the bone. It has the falx

\((s)\) The bones of the cranium being perfectly distinct, and the muscles in young persons not acting much, the shape of the head has been supposed to depend much on the management of children when very young. Ve-

velius, who has remarked the difference in people of different nations, observes, for instance, that the head of a Turk is conical, from the early use of the turban; whilst that of an Englishman is flattened by the chin-slap. Some of the latest physiologists suppose, with good reason, that this difference is chiefly owing to certain natural causes with which we are as yet unacquainted.
Part I. ANATOMY.

Of the longitudinal sinuses lodged in the head, there are many depressions, which appear like digital impressions, and owe their formation to the prominent circumvolutions of the brain. In the occiput, the forehead is composed of two distinct bones; so that in them the sagittal future reaches from the os occipitis to the note. This bone is almost every where composed of two tables and a diploe. These two tables separating from each other under the eyes, form two cavities, one on each side of the face, called the frontal sinuses. These sinuses are lined with a soft membrane, called mucous ptilitaria. In these sinuses a mucus is secreted, which is constantly passing through two small holes into the nostrils, which it serves to moisten. It passes regularly so; at its inferior part, where it is covered with cartilage, it serves the opening of the Eustachian tube, a canal which is joined by the sphenoidal future. To the os sphenoides and petrosum, this bone, called the lambdoidal future.

The os occipitis is of greater strength and thickness than either of the other bones of the head, though irregularly so; at its inferior part, where it is thinned, it is covered by a great number of muscles. This bone, from its situation, being more liable to be injured by falls, than any other bone of the head, nature has wisely given it the greatest strength at its upper part, where it is most exposed to danger.

It is joined to the parietal bones by the lambdoidal future, and to the os temporal, by the addition of a bony prominence to the cranial circumference. This prominence is connected to the os sphenoides by the cuneiform processes. It is by means of the os occipitis that the head is united to the trunk, the two condyles of this bone being connected to the superior oblique processes of the first vertebra of the neck.

There are two temporal bones, one on each side. Of the temporal bone.

We may distinguish in them two parts; one of which is called the squamous or zygaprobit, and the other the petrosa from its hardness. This last is shaped like a pyramid.

Each of these divisions affords processes and cavities: externally there are three processes; one anterior, called the zygomatic processes; one posterior, called the mastoid or mastoidal processes, from its resemblance to a nipple; and one inferior, called the styloid processes, because it is shaped like a filletto, or dagger.

The cavities are, 1. The meatus auditorius externus. 2. A large fossa which serves for the articulation of the lower jaw; it is before the meatus auditorius, and immediately under the zygomatic processes. 3. The hylo-malloid hole, so called from its situation between the styloid and mastoid processes; it is likewise filled by the aqueduct of Fallopus, and affords a passage to the porio duae of the auditory, or seventh pair of nerves.

Below, and on the fore-part of the last foramen, we observe part of the jugular fossa, in which the beginning of the internal jugular vein is lodged. Anterior and superior to this fossa is the orifice of a foramen, through which passes the carotid artery. This foramen runs first upwards and then forwards, forming a kind of elbow, and terminates at the end of the os petrosum. At this part of each temporal bone, we may observe the opening of the Eustachian tube, a canal which passes from the ear to the back part of the nose.

In examining the internal surface of these bones, we may remark the triangular figure of their petrous part which separates two fossae; one superior and anterior, the other inferior and posterior; the latter of these compposes part of the fossa, in which the cerebellum is placed;
Of the ossa sphenoides.

This bone, from its situation amidst the other bones of the head, has been sometimes called unumformes. It is of a very irregular figure, and has been compared to a bat with its wings extended.

It is commonly divided into its middle part or body, and its sides or wings.

The fore part of the body has a spine or ridge, which makes part of the septum narium. The upper part of each wing forms a share of the temple. The fore part of this belongs to the orbit; while the under and back part, termed spinous process, is lodged in the base of the skull at the point of the pars petrosa. But two of the most remarkable processes are the pterygoid or aliform, one on each side of the body of the bone, and at no great distance from it. Each of these processes is divided into two wings, and of these the exterior one is the widest. The other terminates in a hook-like process.

The internal surface of this bone affords three fosse.

Two of these are formed by the wings of the bone, and make part of the lesser fossa of the basis of the cranium. The third, which is smaller, is on the top of the body of the bone; and is called cella turcica, from its resemblance to a Turkish saddle. This fossa, in which the pituitary gland is placed, has posteriorly and anteriorly processes called the clinoform processes.

There are twelve holes in this bone, viz. six on each side. The first is the passage of the optic nerve and ocul ar artery; the second, or large slit transmits the third, fourth, fifth, and sixth part of the fifth pair of nerves with the ocul ar vein; the third hole gives passage to the second branch of the fifth pair; and the fourth hole to the third branch of the fifth pair of nerves. The fifth hole is the passage of the artery of the dura mater. The sixth hole is situated above the pterygoid processes of the sphenoid bone; through it a reflected branch of the second part of the fifth pair passes.

Within the substance of the os sphenoides there are, two sinuses separated by a bony plate. They are lined with the pituitary membrane; and like the frontal sinuses, separate a mucous which passes into the nostrils.

The os sphenoides is joined to all the bones of the cranium; and likewise to the os maxillarium, os malarum, os palatii, and vomer.

This bone makes part of the basis of the skull, affords forming the orbits, and affords attachment to several muscles.

The os ethmoides is situated at the fore part of the basis of the cranium, and is of a very irregular figure.

Of the os ethmoides.

It consists of a middle part and two sides. The middle part is formed of a thin bony plate, in which are an infinite number of holes that afford a passage to filaments of the olfactory nerve. From the middle of this plate, both on the outside and from within, there rises up a process, which may be easily distinguished. The inner one is called cribrum galli, from its supposed resemblance to a cock's comb. To this process the falix of the dura mater is attached. The exterior process, which has the fame common basis as the cribrum galli, is a fine lamella which is united to the vomer; and divides the cavity of the nostrils, though unequally, it being generally a little inclining to one side.

The lateral parts of this bone are composed of a cellular substance; and these cells are so very intricate, that their figure or number cannot be described. Many writers have on this account called this part of the bone the labyrinth. These cells are externally covered with a very thin bony lamella. This part of the bone is called the os planum, and forms part of the orbit.

The different cells of this bone, which are numerous, and which are everywhere lined with the pituitary membrane, evidently serve to enlarge the cavity of the nose, in which the organ of smelling resides.

This bone is joined to the os sphenoides, os frontis, os maxillarium, os palatii, os nasi, os unguis, and vomer.

The ancients, who considered the brain as the seat of all the humours, imagined that this viscus discharged its redundant moisture through the holes of the ethmoid bone. And the vulgar still think, that abscesses of the brain discharge themselves through the mouth and ears, and that snuff is liable to get into the head; but neither snuff nor the matter of an abscess are more capable of passing through the cribiform bone, than the ferocity which they suppos'd was discharged through it in a common cold. All the holes of the ethmoid bone are filled up with the branches of the olfactory nerve. Its inner part is likewise covered with the dura mater, and its cells are everywhere lined with the pituitary membrane; so that neither matter nor any other fluid can possibly pass through this bone either externally or internally. Matter is indeed sometimes discharged through the nostrils: but the seat of the disease is in the sinuses of the nose, and not in the brain; and impollubatations are observed to take place in the ear, which suffurate and discharge themselves externally.

Before we leave the bones of the head, we wish to make some general observations on its structure and figure.—As the cranium might have been composed of a single bone, the articulation of its several bones being absolutely without motion, it may be asked perhaps, Why such a multiplicity of bones, and so great number of futures? Many advantages may possibly arise from this plurality of bones and futures, which may not yet have been observed. We are able, however, to point out many useful ends, which could only be accomplished by this peculiarity of structure. In this, as in all the other works of nature, the great wisdom of the Creator is evinced, and cannot fail to excite our admiration and gratitude.
Of the bones of the face.

The face, which consists of a great number of bones, is commonly divided into the upper and lower jaws. The upper jaw consists of thirteen bones, exclusive of the teeth. Of these, six are placed on each side of the maxilla superior, and one in the middle.

The bones, which are in pairs, are the os mala-

rum, os maxillarium, os nasi, os unguis, os palati, and os sphenoides inferius. The single bone is the vomer.

These are the prominent square bones which are placed under the eyes, forming part of the orbits and the upper parts of the cheeks. Each of them affords three surfaces; one exterior and a little convex; a second superior and concave, forming the inferior part and sides of the orbit; and a third posterior, irregular, and hollowed for the lodgment of the lower part of the temporal muscle.

The angles of each bone form four processes, two of which may be called orbitar processes; of these the upper one is joined by future to the os frontis, and that below to the maxillary bone. The third is connected with the os sphenoides by means of the trig-}

A N A T O M Y. 691

verse future; and the fourth is joined to the zygoma.

Of the os malarum, the bones, as we have before observed, are perfectly distinct from each other. Their differentiation begins in the middle of each bone, and proceeds gradually to the circumference. Hence the os malarum and the maxilla (or the zygoma) are both growing at the same time. Hence it happens, that the heads of young people, in which the bones begin to touch each other, increase slowly; and that the proportionate increase of the volume of the head is greater in three months in the face, than it is perhaps in twenty-four months at the age of fourteen or fifteen years.

The futures, exclusive of their advantages in sustaining the processes of the dura mater, are evidently of great utility in preventing the too great extent of fractures of the skull. Suppose, for instance, that by a fall or blow, one of the bones of the cranium becomes fractured. The injury, which in a head composed of only one bone, would be liable to extend itself through the whole of it, is checked; and sometimes perhaps stopped by the first face it meets, and the effects of the injury are confined to the bone on which the blow was received. Ruyfch indeed, and some others, will not allow the futures to be of any such use; but cases have been known in which the parts seemed to have had this effect, and in young subjects their utility in this respect must be still more obvious.

The spherical form of the head seems likewise to render it more capable of resisting external violence than any other shape would do. In a vault, the parts mutually support and strengthen each other, and this happens in the cranium.

§ 2. Proper Bones of the Face.

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The bones, which are in pairs, are the os malarum, os maxillarium, os nasi, os unguis, os palati, and os sphenoides inferius. The single bone is the vomer.

These are the prominent square bones which are placed under the eyes, forming part of the orbits and the upper parts of the cheeks. Each of them affords three surfaces; one exterior and a little convex; a second superior and concave, forming the inferior part and sides of the orbit; and a third posterior, irregular, and hollowed for the lodgment of the lower part of the temporal muscle.

The angles of each bone form four processes, two of which may be called orbitar processes; of these the upper one is joined by future to the os frontis, and that below to the maxillary bone. The third is connected with the os sphenoides by means of the tran-
ANATOMY.

Part I.

The ossa unguis are of an irregular figure. Their external surface consists of two smooth parts, divided by a middle ridge. One of these parts, which is concave and near to the nose, serves to support the lachrymal face and part of the lachrymal duct. The other, which is flat, forms a small part of the orbit.

Each of these bones is connected with the os frontis, os ethmoides, and os maxillare superius.

These bones, which are situated at the back part of the roof of the mouth, between the os sphenoides and the os maxillaria superius, are of a very irregular shape, and serve to form the nasal and maxillary fossa, and a small part of the orbit. Where they are united to each other, they rise up into a spine on their internal surface. This spine appears to be a continuation of that of the superior maxillary bones, and helps to form the septum narium.

These bones are joined to the os maxillaria superius, os ethmoides, os sphenoides, and vomer.

This bone derives its name from its resemblance to the vomer. This bone is formed of two smooth parts, divided cartilage. The inferior portion of this bone is placed on the nasal spine of the maxillary and palatum bones, which we mentioned in our description of the os palati.

The vomer is united to the os sphenoides, os ethmoides, os maxillaria superius, and os palati. It forms part of the septum narium, by dividing the back part of the nose into two nostrils.

These bones are covered with the pituitary membrane; and, besides their connection with the ethmoid bone, are joined to the os maxillaria superius, os palati, and os unguis.

The maxilla, or lower jaw, which in its shape resembles a horse-shoe, consists of two distinct bones in the foetus; but these unite together soon after birth, so as to form only one bone. The upper edge of this bone, like the os maxillare superius, is an alveolar process, furnished with sockets for the teeth.

On each side the posterior part of the bone rises almost perpendicularly into two processes. The highest of these, called the coronoid process, is pointed and thin, and serves for the insertion of the temporal muscle. The other, or condylar process, as it is called, is shorter and thicker, and ends in an Oblong rounded head, which is received into a fossa of the temporal bone, and is formed for a moveable articulation with the cranium. This joint is furnished with a moveable cartilage. At the bottom of each coronoid process, on its inner part, we observe a foramen extending under the roots of all the teeth, and terminating at the outer surface of the bone near the chin. Each of these canals transmits an artery, vein, and nerve, from which branches are sent off to the teeth.

The lower jaw is capable of a great variety of motion. By sliding the condyles from the cavity towards the eminences on each side, we bring it horizontally forwards, as in biting; or we may bring the condyles only forward, and tilt the rest of the jaw backward, as in opening the mouth. We are likewise able to slide the condyles alternately backwards and forwards from the cavity to the eminence, and vice versa, as in grinding the teeth. The cartilages, by adapting themselves to the different inequalities in these several motions of the jaw, serve to secure the articulation, and to prevent any injuries from friction.

The alveolar process is composed of an outer and inner bony plate, united together by thin partitions, which at the fore part of the jaw divide the processes into as many sockets as there are teeth. But at the back part of the jaw, where the teeth have more than one root, we find a distinct cell for each root. In both jaws these processes begin to be formed with the teeth; they likewise accompany them in their growth, and gradually disappear when the teeth are removed.

§ 3. Of the Teeth.

The teeth are bones of a particular structure, formed for the purposes of mastication and the articulation of the voice. It will be necessary to consider their composition and figure, their number and arrangement, and the time and order in which they appear.

In each tooth we may distinguish a body, a neck, and a root or fangs.

The body of the tooth is that part which appears above the gums. The root is fixed into the socket, and the neck is the middle part between the two.

The teeth are composed of two substances, viz. enamel and bone. The enamel, or the vitreous or cortical part of the tooth, is a white and very hard and compact substance peculiar to the teeth, and appears fibrous or irritated when broken. This substance is thickest on the grinding surface, and becoming gradually thinner, terminates insensibly at the neck of the tooth. Ruych * affirmed, that he could trace the arteries into the hardest part of the teeth; Liewen. to no. 15. hoek * supposed the fibres of the enamel to be fo many vessels; and Monro † says, he has frequently injected the vessels of the teeth in children, so as to make the inside of the corona appear perfectly red. Anatom. But it is certain, that it is not tinged by a madder diet, the Human and that no injection will ever reach it, so that it has no appearance of being vascular.

The bony part, which composes the inner substance on the Teeth, of the body, neck, and root of the tooth, resembles other bones in its structure, but it is much harder than the most compact part of bones in general. As a tooth when once formed receives no tinge from a madder diet, and as the minutest injections do not penetrate into its substance, this part of a tooth has, like the enamel, been supposed not to be vascular. But when we consider that the fangs of a tooth are invested by

* Rusch
† Monro
ANATOMY.

The two first of the molares, or those nearest to the canine teeth on each side, differ from the other three, and are with great propriety named bicuspides by Mr Hunter. They have sometimes only one root, and seem to be of a middle nature between the incifores and the larger molares. The two next are much larger. The fifth or last grinder on each side is smaller and shorter than the rest; and from its not cutting the gum till after the age of twenty, and sometimes not till much later in life, is called dens fissure.

There is in the structure and arrangement of all these teeth an art which cannot be sufficiently admired. To understand it properly, it will be necessary to consider the under jaw as a kind of lever, with its fixed points at its articulations with the temporal bones:—it will be right to observe, too, that its powers arise from its different muscles, but in elevation chiefly from the temporalis and masseter; and that the alveolus constitutes the object of resistance. It will appear, then, that the molares, by being placed nearest the centre of motion, are calculated to pref with a much greater force than the other teeth, independent of their grinding powers which they possess by means of the pterygoid muscles; and that it is for this reason we put between them any hard body we wish to break.

The canini and incifores are placed farther from this point, and of course cannot exert so much force; but they are made for cutting and tearing the food, and this form seems to make amends for their deficiency in strength.

There are examples of children who have come into the world with two, three, and even four teeth; but these examples are very rare; and it is seldom before the seventh, eighth, or ninth month after birth, that the incifores, which are the first formed, begin to pass through the gum. The symptoms of dentition, however, in consequence of irritation from the teeth, frequently take place in the fourth or fifth month.—About the twentieth or twenty-fourth month, the canini and two molares make their appearance.

The dangerous symptoms that sometimes accompany dentition, are owing to the pressure of the teeth on the gum, which they irritate so as to excite pain and inflammation. This irritation seems to occasion a gradual wasting of the gum at the part, till at length the tooth makes its appearance.

The symptoms are more or less alarming, in proportion to the resistance which the gum affords to the teeth, and according to the number of teeth which may chance to seek a passage at the same time. Were they all to appear at once, children would fall victims to the pain and excessive irritation; but Nature has so very wisely disposed of them, that they usually appear one after the other, with some distance of time between each. The first incisor that appears is generally in the lower jaw, and is followed by one in the upper

(n) Mr Hunter has thought proper to vary this division. He retains the old name of incifores to the four fore teeth, but he distinguishes the canine teeth by the name of the canispidat. The two teeth which are next to these, and which have been usually ranked with the molares, he calls the bicuspides; and he gives the name of grinders only to the three last teeth on each side.

1) Mr Hunter remarks of these teeth, that we may trace in them a similarity in shape, situation, and use, from the most imperfectly carnivorous animal, which we believe to be the human species, the lion, which is the most perfectly carnivorous.
The trunk of the skeleton consists of the spine, the thorax, and the pelvis.

The spine is composed of a great number of bones called vertebrae, forming a long bony column, in figure not much unlike the letter T. This column, which extends from the head to the lower part of the body, may be said to consist of two irregular and unequal pyramids, united to each other in that part of the loins where the last lumbar vertebra joins the os sacrum.

The vertebrae of the upper and longest pyramid are called true vertebrae, in contradistinction to those of the lowermost pyramid, which, from their being immovable in the adult, are styled false vertebrae. It is upon the bones of the spine that the body turns; and it is to this circumstance they owe their name, which is derived from the Latin verb vertere, to turn.

The true vertebrae are divided into three classes of cervical, dorsal, and lumbar vertebrae.—The false vertebrae consist of the os sacrum and os coecygis. In each vertebrae, as in other bones, it will be necessary to remark the body of the bone, its processes, and cavities.

The body, which is convex before, and concave behind, where it affixes in forming the cavity of the spine, may be compared to part of a cylinder cut off transversely. Each vertebra affords seven processes. The first is at the back part of the vertebra, and from its shape and direction is named the spinous process. On each side of this are two others, which, from their situation with respect to the spine, are called transverse processes. The four others are styled oblique or articular processes. They are much smaller than the spinous or transverse ones. Two of them are placed on the upper, and two on the lower part of each vertebrae, rising from near the bases of each transverse process. They have gotten the name of oblique processes, from their situation with respect to the processes with which they are articulated; and they are sometimes styled articular processes, from the manner in which they are articulated with each other; the two superior processes of one vertebra being articulated with

(k) This bone is very seldom preserved with the skeleton, and cannot be included among the bones of the head, or any other division of the skeleton. Thomas Bartholin has perhaps very properly describ'd it among parts contained in the mouth; but the generality of anatomical writers have plac'd it, as it is here, after the bones of the face.
with the two inferior processes of the vertebra above it. Each of these processes is covered with cartilage at its articulation, and their articulations with each other are by a species of ginglymus.

In each vertebra, between its body and its processes, we find a hole large enough to admit a finger. These holes or foramina, correspond with each other through all the vertebrae, and form the long bony channel in which the spinal marrow is placed. We may likewise observe four notches in each vertebra. Two of these notches are at the upper, and two at the lower part of the bone, between the oblique processes and the body of the vertebra. Each of these notches meeting with a similar opening in the vertebra above or below it, forms a foramen for the passage of blood-vessels, and of the nerves out of the spine.

The bones of the spine are united together by means of a sub stance, which in young subjects appears to be of a ligamentous, but in adults more of a cartilaginous nature. This intervertebral substance, which forms a kind of partition between the several vertebrae, is thicker and more flexible between the lumbar vertebrae than in the other parts of the spine, the most considerable motions of the trunk being performed on those vertebrae. This substance being very elastic, the extension and flexion of the body, and its motion backwards and forwards, to either side, are performed with great facility. This elasticity seems to be the reason why people who have been long standing, or have carried a considerable weight, are found to be shorter than when they have been long in bed. In the two first instances the intervertebral cartilages (as they are usually called) are evidently more exposed to compression than when we are in bed in an horizontal posture.

In advanced life these cartilages become shrivelled, and of course lose much of their elasticity. This may serve to account for the decrease in stature and the sloping forward which are usually to be observed in old people.

Besides the connection of the several vertebrae by means of this intervertebral sub stance, there are likewise many strong ligaments, both external and internal, which unite the bones of the spine to each other. Their union is also strengthened by a variety of strong mufcles that cover and surround the spine.

The bones of the spine are found to diminish in density, and to be less firm in their texture in proportion as they increase in bulk; so that the lowermost vertebrae, though the largest, are not so heavy in proportion as the upper ones. By this means the size of these bones is increased without adding to their weight: a circumstance of no little importance in a part like the spine, which, besides flexibility and suppleness, seems to require lightness as one of its essential properties.

In young children, each vertebra consists of three bony pieces united by cartilages which afterwards ossify.

There are seven vertebrae of the neck—they are of a firmer texture than the other bones of the spine. Their transverse processes are forked for the lodgement of muscles, and at the bottom of each we observe a foramen, through which pass the cervical artery and vein. The first and second of these vertebrae must be described more particularly. The first approaches almost to an oval shape. On its superior surface it has two cavities which admit the condyles of the occipital bone, with which it is articulated. This vertebra, which is called atlas from its supporting the head, cannot well be described as having either body or spinous processes, being a kind of bony ring. Anteriorly, where it is articulated to the odontoid process of the second vertebra, it is very thin. On its upper surface it has two cavities which admit the condyles of the occipital bone. By this connection the head is allowed to move forwards and backwards, but has very little motion in any other direction.

The second vertebra has gotten the name of dentata, from its having, at its upper and inferior part, a process called the odontoid or tooth-like process, which is articulated with the atlas, to which this second vertebra may be said to serve as an axis. This odontoid process is of a cylindrical shape, somewhat flattened, however, anteriorly and posteriorly. At its fore-part where it is received by the atlas, we may observe a smooth, convex, articulating surface. It is by means of this articulation that the head performs its rotatory motion, the atlas in that case moving upon this odontoid process as upon a pivot. But when this motion is in any considerable degree, or, in other words, when the head moves much either to the right or left, all the cervical vertebrae seem to affilt, otherwise the spinal marrow would be in danger of being divided transversely by the first vertebra.

The spinous processes of each of the cervical vertebrae are shorter, and their articular processes more oblique, on the back than in the other bones of the spine. These two vertebrae are of a middle size between those of the neck and loins. At their sides we may observe two depressions, one at the upper and the other at the lower part of the body of each vertebra; which unites with similar depressions in the vertebrae above and below, form articulating surfaces, covered with cartilages, for receiving the heads of the ribs; and at the fore part of their transverse processes (excepting the two last) we find an articulating surface for receiving the tubercles of the ribs.

These five vertebrae differ only from those of the back in being larger, and in having their spinous processes at a greater distance from each other. The most considerable motions of the trunk are made on these vertebrae; and these motions could not be performed with so much ease, were the processes placed nearer to each other.

The os sacrum, which is composed of five or six pieces in young subjects, becomes one bone in more advanced age.

It is nearly of a triangular figure, its inferior portion being bent a little forwards. Its superior part has two oblique processes which are articulated with the left of the lumbar vertebrae; and it has likewise commonly three small spinous processes, which gradually become shorter, so that the lowermost is not so long as the second, nor the second as the uppermost. Its transverse processes are formed into one oblong process, which becomes gradually smaller as it descends. Its concave or anterior side is usually smooth, but its posterior convex side has many prominences (the most remarkable of which are the spinous processes just now mentioned), which are filled up and covered with the muscular and tendinous parts behind.
This bone has five pairs of holes, which afford a passage to blood-vessels, and likewise to the nerves that are derived from the spinal marrow, which is continued even here, being lodged in a triangular cavity, that becomes smaller as it descends, and at length terminates obliquely at the lower part of this bone. Below the third division of the os sacrum, this canal is not completely bony as in the rest of the spine, being secured at its back part only by a very strong membrane, so that a wound at that part must be extremely dangerous.

The os sacrum is united laterally to the os inominata or hip-bones, and below to the coccyx.

The coccyx, which, like the os sacrum, is in young people made up of three or four distinct parts, usually becomes one bone in the adult state.

It serves to support the intestinum rectum; and, by its being capable of some degree of motion at its articulation with the sacrum, and being like that bone bent forwards, we are enabled to sit with ease.

This bone is nearly of a triangular shape, being broadest at its upper part, and from thence growing narrower to its apex, where it is not bigger than the little finger.

It has got its name from its supposed resemblance to a cuckow's beak. It differs greatly from the vertebræ, being commonly without any processæ, and having no cavity for the spinal marrow, or foramina for the transmission of nerves.

The spine, of which we have now finished the anatomical description, is destined for many great and important uses. The medulla spinalis is lodged in its bony canal secure from external injury. It serves as a defence to the abdominal and thoracic visceræ, and at the same time supports the head, and gives a general firmness to the whole trunk.

We have before compared it to the letter J, and its different turns will be found to render it not very unlike the figure of that letter. In the neck we see it projecting somewhat forward to support the head, which without this assistance would require a greater number of muscles. — Lower down, in the thorax, we find it taking a curved direction backwards, and of course increasing the cavity of the chest. After this, in the loins, it again projects forwards in a direction with the centre of gravity, by which means we are easily enabled to keep the body in an erect posture, for otherwise we should be liable to fall forward. Towards its inferior extremity, however, it again recedes backward, and thus assists in forming the pelvis, the name given to the cavity in which the urinary bladder, intestinum rectum, and other visceræ are placed.

If this bony column had been formed only of one piece, it would have been much more easily fractured than it is now: and by confining the trunk to a stiff situation, a variety of motions would have been altogether prevented, which are now performed with ease by the great number of bones of which it is composed.

It is firm, and yet to this firmness there is added a perfect flexibility. If it be required to carry a load upon the head, the neck becomes stiff with the assistance of its musculæ, and accommodates itself to the load, as if it was composed only of one bone.—In stooping like wise, or in turning to either side, the spine turns itself in every direction, as if all its bones were separated from each other.

In a part of the body, like the spine, that is made up of so great a number of bones, and intended for such a variety of motion, there must be a greater danger of dislocation than fracture; but we shall find, that this is very wisely guarded against in every direction by the processes belonging to each vertebra, and by the ligaments, cartilages, &c. by which these bones are connected with each other.

§ 2. Of the Bones of the Thorax.

The thorax, or chest, is composed of many bones, viz. the sternum which is placed at its anterior part, twelve ribs on each side which make up its lateral parts, and the dorsal vertebrae which constitute its posterior part. These last have been already described.

The sternum is the long bone which extends itself from the upper to the lower part of the breast anteriorly, and to which the ribs and the clavicles are articulated.

In children it is composed of several bones united by cartilages; but as we advance in life, most of these cartilages ossify, and the sternum in the adult state is found to consist only of three pieces, and sometimes becomes one bone. It is however generally described as being composed of three parts—one superior, which is broad, thick, and short; and one in the middle, which is thinner, narrower, and longer than the other.

It terminates at its lower part by a third piece, which is called the xyphoid, or sword-like cartilage, from its supposed resemblance to the blade of a sword, and because in young subjects it is commonly in a cartilaginous state.

We have already observed, that this bone is articulated with the clavicle on each side. It is likewise joined to the fourteen true ribs, viz. seven on its right and seven on its left side.

The ribs are bones shaped like a bow, forming one of the sides of the chest. There are twelve on each side. They are distinguished into true and false ribs: The seven upper ribs which are articulated to the sternum are called true ribs, and the five lower ones that are not immediately attached to that bone are called false ribs.

On the inferior and interior surface of each rib, we observe a sinuosity for the lodgement of an artery, vein, and nerve.

The ribs are not bony through their whole length, their anterior part being cartilaginos. They are articulated with the vertebrae and sternum. Every rib (or at least the greater number of them) has at its posterior part two processæ; one at its extremity called the head of the rib, by means of which it is articulated with the body of two vertebrae; and another, called its tuberosity, by which it is articulated with the transverse process of the lowest of these two vertebrae. The first rib is not articulated by its extremity to two vertebrae, being simply attached to the upper part of the first vertebra of the back. The seven superior or true ribs are articulated anteriorly with the sternum by their cartilages; but the false ribs are supported in a different manner—the eighth, which is the first of these ribs,
Ofteology.

39. Os ilium.

The pelvis is composed of the os sacrum, os coccygis, and two osa innominata. The two first of these bones were included in the account of the spine, to which they more properly belong.

In children, each os innominatum is composed of three distinct bones; but as we advance in life the intermediate cartilages gradually ossify, and the marks of the original separation disappear, so that they become one irregular bone; still however continuing to retain the names of ilium, ischium, and pubis, by which their divisions were originally distinguished, and to be described as three different bones by the generality of anatomists. The os ilium forms the upper and most considerable part of the bone, the os ischiun lower and posterior portion, and the os pubis its fore part.

The os ilium or haunch bone, is articulated posteriorly to the os sacrum by a firm cartilaginous substance, and is united to the os pubis before and to the os ischiun below. Its superior portion is thin, and terminates in a ridge called the crista or spine of the ilium, and more commonly known by the name of the haunch. This crista rises up like an arch; being turned somewhat outwards, so as to resemble the wings of a phaeton.

Externally this bone is unequally prominent and hollowed for the lodging of muscles; internally we find it smooth and concave. At its lower part there is a considerable ridge on its inner surface. This ridge extends from the os sacrum, and corresponds with a similar prominence both on that bone and the ischium; forms with the inner part of the os pubis what in midwifery is termed the brim of the pelvis.

The crista, or spine, which at first is an epiphyseal, has two considerable tubercules; one anteriorly, and the other posteriorly, which is the largest of the two. These, from their projecting more than the parts of the bones below them, have given the name of spinous processes. From the anterior spinous processes, the sartorius and tenor vagus femoris muscles have their origin; and below the posterior processes we observe a considerable niche in the bone, which, in the recent subject, is formed into a large foramen, by means of a strong ligament that is stretched over its lower part from the os sacrum to the sharp-pointed process of the ischium. This hole affords a passage to the great sciatic nerve, and to the posterior crural vessels under the pyramidal muscle, part of which likewise passes out here.

The os ischium, or hip-bone, which is of a very irregular figure, constitutes the lower lateral parts of the pelvis, and is commonly divided into its body, tuberosity, and ramus. The body forms the lower and more considerable portion of the acetabulum, and sends a sharp-pointed process backwards, called the spine of the ischium. To this process the ligament adheres, which was just now spoken of, as forming a foramen for the passage of the sciatic nerves. — The tuberosity which is the lowest part of the trunk, and supports us when we sit, is large and irregular, affording origin to several muscles. From this tuberosity we find the bone becoming thinner and narrower. This part, which has the name of ramus or branch, passes forwards and upwards, and concurs with the ramus of the os pubis, to form a large hole called the foramen magnum ilchii, or thyroidem, as it is sometimes named from its resemblance to a door or shield. This hole, which in the recent subject is closed by a strong membrane called the obturator ligament, affords through its whole circumference attachment to muscles. At its upper part where we observe a niche in the bone; it gives passage to the obturator vessels and nerves, which go to the inner part of the thigh. Nature seems everywhere to avoid an unnecessary weight of bone, and this foramen, no doubt, serves to lighten the bones of the pelvis.

The os pubis or thorne-bone, which with its fellow forms the fore-part of the pelvis, is the smallest division of the os innominatum. It is united to its fellow by means of a strong cartilage, which forms what is called the symphysium pubis.

In each os pubis we may distinguish the body of the bone, its angle, and ramus. The body or outer part is united to the os ilium. The angle comes forward to form the symphysium, and the ramus is a thin process which unites with the ramus of the ischium, to form the foramen thyroidem.

The three bones we have described as composing each os innominatum, all afflitt in forming the acetabulum, in which the head of the os femoris is received.

This cavity is every where lined with a smooth cartilage, excepting at its inner part, where we may observe a little fold, in which are lodged the muisilaginous glands of the joint. We may likewise observe the pit or depression made by the round ligament, as it is improperly called, which, by adhering to this cavity and to the head of the thigh-bone, helps to secure the latter in the socket.

These bones, which are united to each other and to the spine by many very strong ligaments, serves to support the trunk, and to connect it with the lower extremities; and at the same time to form the pelvis or basin, in which are lodged the intestines and urinary bladder, and in women the uterus; so that the study of this part of osteology is of the utmost importance to midwifery.

It is worthy of observation, that in women the os sacrum is usually shorter, broader, and more hollowed, the os ilium more expanded, and the inferior opening of the pelvis larger than in men. 

40.
43. These parts of the skeleton consist of the upper extremity and the lower.

§ 1. Of the Upper Extremity.

This consists of the shoulder, the arm, and the hand.

1. Of the Shoulder.

The shoulder consists of two bones, the clavicles and the scapula.

The former, which is so named from its resemblance to the key in use amongst the ancients, is a little curved at both its extremities like an italic :. It is likewise called jugulum, or collar-bone, from its situation. It is about the size of the little finger, but longer, and being of a very spongy substance is very liable to be fractured. In this, as in other long bones, we may distinguish a head and a body, and two extremities. The body is rather flattened than rounded. The anterior extremity is formed into a slightly convex head, which is nearly of a triangular shape. The inferior surface of the head is articulated with the sternum. The posterior extremity, which is flatter and broader than the other, is connected to a process of the scapula, called acromion.

Both these articulations are secured by ligaments, and in that with the sternum we meet with a moveable cartilage, to prevent any injury from friction.

The clavicle serves to regulate the motions of the scapula, by preventing it from being brought too much forwards, or carried too far backwards. It affords origin to several muscles, and helps to cover and protect the subclavians vessels, which derive their name from their situation under this bone.

47. Of the scapula.

The scapula, or shoulder-blade, which is nearly of a triangular shape, is fixed to the posterior part of the true ribs, somewhat in the manner of a buckle. It is of a very unequal thickness, and like all other broad, flat bones, is somewhat cellular. Externally it is convex, and internally concave, to accommodate itself to the convexity of the ribs. We observe in this bone three unequal sides, which are thicker and stronger than the body of the bone, and are therefore termed its corsets. The largest of the three, called also the basin, is turned towards the vertebrae. Another, which is less than the former, is below this; and the third, which is the least of the three, is at the upper part of the bone. Externally the bone is elevated into a considerable spine, which rising small at the basin of the scapula, becomes gradually higher and broader, and divides the outer surface of the bone into two fossa. The superior of these, which is the smallest, serves to lodge the supraspinatus muscle; and the inferior fossa, which is much larger than the other, gives origin to the infra spinatus. This spine terminates in a broad and flat process at the top of the shoulder, called the processus acromion, to which the clavicle is articulated. This process is hollowed at its lower part to allow a passage to the supraspinatus and infraspinatus muscles. The scapula has likewise another considerable process at its upper part, which, from its resemblance to the beak of a bird, is called the coracoid process. From the outer side of this coracoid process, a strong ligament passes to the processus acromion, which prevents a luxation of the os humeri upwards. A third process begins by a narrow neck, and ends in a cavity called glenoid, for the connection of the os humeri.

The scapula is articulated with the clavicle and os humeri, to which it serves as a fulcrum; and by varying its position it affords a greater scope to the bones of the arm in their different motions. It likewise gives origin to several muscles, and posteriorly serves as a defence to the trunk.

2. Bones of the Arm.

The arm is commonly divided into two parts, which are articulated to each other at the elbow. The upper part retains the name of arm, properly so called, and the lower part is usually called the forearm.

The arm is composed of a single bone called os humeri. This bone, which is almost of a cylindrical shape, may be divided into its body and its extremities.

The upper extremity begins by a large, round smooth head, which is admitted into the glenoid cavity of the scapula. On the upper and fore part of the bone there is a groove for lodging the long head of the biceps muscle of the arm; and on each side of the groove, at the upper end of the bone, there is a tubercle to which the spinatus muscles are fixed.

The lower extremity has several processes and cavities. The principal processes are its two condyles, one exterior and the other interior, and of these the is the largest. Between these two we observe two lateral protuberances, which, together with a middle cavity, form as it were a kind of pulley upon which the motions of the forearm are chiefly performed. At each side of the condyles, as well exteriorly as interiorly, there is another eminence which gives origin to several muscles of the hand and fingers.

Posteriorly and superiorly, speaking with respect to the condyles, we observe a deep fossa which receives a considerable process of the ulna; and anteriorly and opposite to this fossa, we observe another, which is much less and receives another process of the same bone.

The body of the bone has at its upper and anterior part a furrow which begins from behind the head of the bone, and serves to lodge the tendon of a muscle. The body of the os humeri is hollow through its whole length, and, like all other long bones, has its marrow.

This bone is articulated at its upper part to the scapula. This articulation, which allows motion every way, is surrounded by a capsular ligament; that is sometimes torn in luxation, and becomes an obstacle to the easy reduction of the bone. Its lower extremity is articulated with the bones of the forearm.

The forearm is composed of two bones, the ulna and radius.

Of the forearm.

The ulna or elbow-bone is much less than the os humeri, and becomes gradually smaller as it descends to the wrist. At its upper part it has two processes, and two cavities. Of the two processes, the largest, which is situated posteriorly, and called the olecranon, is admitted into the posterior fossa of the os humeri. The other process is placed anteriorly, and is called the coronoid process. In bending the arm it enters into the anterior fossa of the os humeri. This process being
Osteology

being much smaller than the other, permits the fore-arm to bend inwards; whereas the olecranon, which is shaped like a hook, reaches the bottom of its fossa in the os humeri as soon as the arm becomes straight, and will not permit the fore-arm to be bent backwards.

The ligaments likewise oppose this motion.

Between the two processes we have described, there is a considerable cavity called the fygmoid cavity, divided into two fossae by a small eminence, which pales from one process to the other; it is by means of this cavity and the two processes, that the ulna is articulated with the os humeri by ginginums.

At the bottom of the coronoid process, there is a small fygmoid cavity, which serves for the articulation of the ulna with the radius.

The body of the ulna is of a triangular shape; its lower extremity terminates by a small head and a little styloid process. The ulna is articulated above to the os humeri—both above and below to the radius, and to the wrist at its lower extremity. All these articulations are secured by means of ligaments. The chief use of this bone seems to be to support and regulate the motions of the radius.

The radius, which is so named from its supposed resemblance to the spoke of a wheel, is placed at the inside of the fore-arm. It is somewhat larger than the ulna, but not quite so long as that bone. Its upper part is cylindrical, hollowed superficially to receive the outer condyle of the os humeri. Laterally it is admitted into the little fygmoid cavity of the ulna, and the cylindrical part of the bone turns in this cavity in the motions of pronation and supination (1). This bone follows the ulna in flexion and extension, and may likewise be moved round its axis in any direction. The lower extremity of the radius is much larger and stronger than its upper part; the ulna, on the contrary, is smaller and weaker below than above; so that they serve to supply each other deficiencies in both those parts.

On the external side of this bone, we observe a small cavity which is defined to receive the lower part of the ulna; and its lower extremity is formed into a large cavity, by means of which it is articulated with the bones of the wrist, and on this account it is sometimes called manusprum manus. It supports the two first bones of the wrist on the side of the thumb, whereas the ulna is articulated with that bone of the wrist which corresponds with the little finger.

Through the whole length both of this bone and the ulna, a ridge is observed, which affords attachment to an interosseous ligament. This ligament fills up the space between the two bones.


The carpus or wrist consists of eight small bones of an irregular shape, and disposed in two unequal rows. Those of the upper row are articulated with the bones of the fore-arm, and those of the lower one with the metacarpus.

The ancient anatomists described these bones numerically; Lyterus seems to have been the first who gave to each of them a particular name. The names he adopted are founded on the figure of the bones, and are now pretty generally received, except the first, which instead of styloid proc. (the name given to it by Lyterus, on account of its sinus, that admits a part of the os magnum), has by later writers been named Scaphoides or Navicularis. This, which is the outermost of the upper row (considering the thumb as the outer side of the hand), is articulated with the radius; on its inner side it is connected with the os lunare, and below to the trapezium and trapezoides. Next to this is a smaller bone called the os lunare; because its outer side, which is connected with the scaphoides, is shaped like a crescent. This is likewise articulated with the radius. On its inner side it joins the os cuneiforme, and anteriorly, the os magnum and os unciforme.

The os cuneiforme, which is the third bone in the upper row, is compared to a wedge, from its being broader above, at the back of the hand, than it is below. Posteriorly it is articulated with the ulna, and anteriorly with the os unciforme.

These three bones form an oblong articulating surface, covered by cartilage, by which the hand is connected with the fore-arm.

The os pisiforme, or pea-like bone, which is smaller than the three just now described, though generally clasped with the bones of the upper row, does not properly belong to either series, being placed on the under surface of the os cuneiforme, so as to project into the palm of the hand. The four bones of the second row correspond with the bones of the thumb and fingers; the first, second, and fourth, are from their shapes named trapezium, trapezoides, and unciforme; the third, from its being the largest bone of the carpus, is styled os magnum.

All these bones are convex towards the back, and slightly concave towards the palm of the hand; their articulating surfaces are covered with cartilages, and secured by many strong ligaments, particularly by two ligamentous expansions, called the external and internal annular ligaments of the wrist. The former extends in an oblique direction from the os pisiforme to the styloid process of the radius, and is an inch and an half in breadth; the latter or internal annular ligament is stretched from the os pisiforme and os unciforme, to the os scaphoides and trapezium. These annular ligaments likewise serve to bind down the tendons of the wrist and fingers.

The metacarpus consists of four bones, which support the fingers; externally they are a little convex, and internally somewhat concave, where they form the palm of the hand. They are hollow, and of a cylindrical shape.

At each extremity they are a little hollowed for their articulation; superiorly with the bones of the carpus, and inferiorly with the first phalanges of the fingers, in the same manner as the several phalanges of the fingers are articulated with each other.

The five fingers of each hand are composed of fifteen bones, disposed in three ranks called phalanges: The bones of the first phalanx, which are articulated with
The metacarpus, are the largest, and those of the last phalanx the smallest. All these bones are larger at their extremities than in their middle part.

We observe at the extremities of the bones of the carpals, metacarpus, and fingers, several inequalities that serve for their articulation with each other; and these articulations are strengthened by means of the ligaments which surround them.

It will be easily understood that this multiplicity of bones in the hand (for there are 27 in each hand) is essential to the different motions we wish to perform. If each finger was composed only of one bone instead of three, it would be impossible for us to grasp anything.

§ 2. Of the Lower Extremities.

Each lower extremity is divided into four parts, viz. the os femoris, or thigh bone; the rotula, or knee-pan; the leg; and the foot.

1. Of the Thigh.

The thigh is composed only of this bone, which is the largest and strongest we have. It will be necessary to distinguish its body and extremities: its body, which is of a cylindrical shape, is convex both in front and concave behind, where it serves to lodge several muscles. Throughout two-thirds of its length we observe a ridge called linea aspera, which originates from the trochanters, and after running for some way downwards, divides into two branches, that terminate in the tuberosities at the lower extremity of the bone. At its upper extremity we must describe the neck and smooth head of the bone, and likewise two considerable processes: The head, which forms the greater portion of a sphere unequally divided, is turned inwards, and received into the great cotyloid cavity of the os innominatum. At this part of the bone there is a little socket to be observed, to which the round ligament is attached, and which we have already described as tending to secure the head of this bone in the great acetabulum. The neck is almost horizontal, asfured with respect to its situation with the body of the bone. Of the two processes, the external one, which is the largest, is called trochanter major, and the other, which is placed on the inside of the bone, trochanter minor. They both afford attachment to muscles. The articulation of the os femoris with the trunk is strengthened by means of a capular ligament, which adheres everywhere where round the edge of the great cotyloid cavity of the os innominatum, and surrounds the head of the bone.

The os femoris moves upon the trunk in every direction. At the lower extremity of the bone are two processes called the condyles, and an intermediate smooth cavity, by means of which it is articulated with the leg by ligaments.

All round the under end of the bone there is an irregular surface where the capular ligament of the joint has its origin, and where blood-veins go into the substance of the bone.

Between the condyles there is a cavity posteriorly, in which the blood-veins and nerves are placed, secured from the compression to which they would otherwise be exposed in the action of bending the leg, and which would not fail to be hurtful.

At the side of each condyle externally, there is a tuberosity, from whence the lateral ligaments originate, which are extended down the tibia.

A ligament likewise arises from each condyle posteriorly. One of these ligaments passes from the right to the left, and the other from the left to the right, so that they intersect each other, and for that reason are called the cres ligaments.

The lateral ligaments prevent the motion of the leg upon the thigh to the right or left; and the cres ligaments, which are also attached to the tibia, prevent the latter from being brought forwards.

In new-born children all the processes of this bone are cartilaginous.

2. The Rotula, or Knee-pan.

The rotula, patella, or knee-pan, as it is differently called, is a flat bone about four or five inches in circumference, and is placed at the fore-part of the joint of the knee. In its shape it is somewhat like the common figure of the heart, with its point downwards.

It is thinner at its edge than in its middle part; at its fore-part it is smooth and somewhat convex; its posterior surface, which is more unequal, affords an elevation in the middle which is admitted between the two condyles of the os femoris.

This bone is retained in its proper situation by a strong ligament which every where surrounds it, and adheres both to the tibia and os femoris; it is likewise firmly connected with the tibia by means of a strong tendinous ligament of an inch in breadth, and upwards of two inches in length, which adheres to the lower part of the patella, and to the tuberosity at the upper end of the tibia.

On account of this connection, it is very properly considered as an appendage to the tibia, which it follows in all its motions, so as to be to it what the olecranon is to the ulna. There is this difference, however, that the olecranon is a fixed process; whereas the patella is moveable, being capable of sliding from above downwards and from below upwards. This mobility is essential to the rotatory motion of the leg.

In very young children this bone is entirely cartilaginous.

The principal use of the patella seems to be to defend the articulation of the knee from external injury; it likewise tends to increase the power of the extensor muscles of the leg, by removing their direction farther from the centre of motion in the manner of a pulley.

3. Of the Leg.

The leg is composed of two bones: Of these the inner one, which is the largest, is called tibia; the other is much smaller, and named fibula.

The tibia, which is so called from its resemblance to the musical pipe of the ancients, has three surfaces, and is not very unlike a triangular prism. Its posterior surface is the broadest; anteriorly it has a considerable ridge called the shin, between which and the skin there are no muscles. At the upper extremity of this bone are two surfaces, a little concave, and separated from each other by an intermediate elevation. The two little cavities receive the condyles of the os femoris, and the eminence between them is admitted into the cavity which we spoke of as being between the two condyles, so that this articulation affords a specimen of the complete
Of the os navicularis, or capitate, (for these two terms have the same signification,) is so called on account of its resemblance to a little bark. At its posterior part, which is concave, it receives the astragalus; anteriorly it is articulated with the cuneiform bones, and laterally it is connected with the os cuboideus.

The os cuboideus forms an irregular cube. Posteriorly it is articulated with the os calcis; anteriorly it supports the two last bones of the metatarus, and laterally it joins the third cuneiform bone and the os navicularis.

Each of the osa cuneiformia, which are three in number, resembles a wedge, and from this similarity their name is derived. They are placed next to the metatarus by the sides of each other, and are usually distinguished into os cuneiforme externum, medium or minimum, and internum or maximum. The superior surface of these bones, from their wedge-like shape, is broader than that which is below, where they help to form the sole of the foot; posteriorly they are united to the os navicularis, and anteriorly they support the three first metatarsal bones.

When these seven bones composing the tarus are viewed together in the skeleton, they appear convex above, where they help to form the upper part of the foot; and concave underneath, where they form the hollow of the foot, in which the vessels, tendons, and nerves of the foot are placed secure from pressure.

They are united to each other by very strong ligaments, and their articulation with the foot is secured by a capsular and two lateral ligaments; each of the latter is covered by an annular ligament of considerable breadth and thickness, which serves to bind down the tendons of the foot, and at the same time to strengthen the articulation.

The os cuneiforme externum is joined laterally to the os cuboideus.

These bones complete our account of the tarus. Though what we have said of this part of the osteology has been very simple and concise, yet many readers may not clearly understand it: but if they will be pleased to view these bones in their proper situation in the skeleton, all that we have said of them will be easily understood.

The metatarsus is made up of five bones, whereas the metacarpus consists only of four. The cause of this difference is, that in the hand the thumb is not included among the metacarpal bones; whereas in the foot the great toe has only two bones. The first of these bones supports the great toe and is much larger than the rest, which nearly resemble each other in size.

These bones are articulated by one extremity with the cuneiform bones and the os cuboideus, and by their other end with the toes.

Each of the toes, like the fingers, consists of three bones, except the great toe, which is formed of two bones. The base of the others are distinguished into three phalanges. Although the toes are more confined in their motion than the fingers, yet they appear to be perfectly fitted for the purposes they are designed for. In walking, the toes bring the centre of gravity perpendicular to the advanced foot; and as the soles of the feet are naturally concave, we can at pleasure increase this concavity, and form a kind of vault, which adjuts itself to the different inequalities that occur
Besides the bones we have already described, there are several small ones that are met with only in the adult skeleton, and in persons who are advanced in life; which, from their supposed general resemblance to the seeds of the fesamum, are called \textit{offa sesamoidea}. They are commonly to be seen at the lower extremity of the fibula, upon the condyles of the thigh-bone, under the os cuboidei of the tarsus, and in other parts of the body. Their size and number seem constantly to be increased by age and hard labour; and as they are generally found in situations where tendons and ligaments are most exposed to the action of muscles, they are now generally considered as ossified portions of ligaments or tendons.

The upper surface of these bones is usually convex, and adherent to the tendon that covers it; the side which is next to the joint is smooth and flat. Though their formation is accidental, yet they seem to be of some use, by raising the tendons farther from the centre of motion, and consequently increasing the power of the muscles. In the great toe and thumb they are likewise useful, by forming a groove for the flexor tendons.

\textbf{EXPLANATION OF THE PLATES OF OSTEOLGY.}

\textbf{PLATE XIX.}

\textbf{FIG. 1. A Front-view of the Male Skeleton.}


\textbf{FIG. 2. A Front-view of the Skull.}


\textbf{FIG. 3. A Side-view of the Skull.}

**Part I.**

ANATOMY.

**Osteology.**

Coronoid processes. Z, The condylar processes, by which the jaw is articulated with the temporal bone.

**Fig. 4.** The posterior and right side of the skull.


**Fig. 5.** The external surface of the os frontis.


**Fig. 6.** The internal surface of the os frontis.


**Plate XX.**

**Fig. 1.** A back view of the skeleton.


**Fig. 2.** The external surface of the left os parietalis.


**Fig. 3.** The internal surface of the same bone.


**Fig. 4.** The external surface of the left os temporalis.


**Fig. 5.** The internal surface of the left os temporalis.


**Fig. 6.** The external surface of the osseous circle, which terminates the meatus auditorius externus.

A, The anterior part. B, A small part of the groove in which the membrana tympani is fixed. N. B, this, with the subseuent bones of the ear, are here delineated as large as the life.

**Fig. 7.** The internal surface of the osseous circle.

A, The anterior part. B, The groove in which the membrana tympani is fixed.

**Fig. 8.** The situation and connection of the small bones of the ear.


**Fig. 9.** The malleus, with its head, handle, and small processes.

**Fig. 10.** The incus, with its body, superior and inferior branches.

**Fig. 11.** The os orbicularis.

**Fig. 12.** The stapes, with its head, base, and two crura.

**Fig. 13.** An internal view of the labyrinth of the ear.

A, The hollow part of the cochlea, which forms a share
Fig. 14. An External View of the Labyrinth.
A, the femicircular canals. B, The fenestra ovalis which leads into the vestibulum. C, The fenestra rotunda which opens into the cochlea. D, The different turns of the cochlea.

Fig. 15. The Internal Surface of the Os Sphenoides.

Fig. 16. The External Surface of the Os Sphenoides.

Fig. 17. The Internal View of the Os Ethmoides.
A, The nafal lamella. BB, The grooves between the nafal lamella and osa pionalia superiorea. CC, The osa pionalia superiorea. DD, The sphenoidal cornua. See Fig. 16. EE, The sphenoidal cornua.

Fig. 18. The Internal View of the Os Ethmoides.

Fig. 19. The right Sphenoidal Cornu.

Fig. 20. The left Sphenoidal Cornu.

Fig. 21. The External Surface of the Os Occipitus.
A, The upper part of the bone. B, The superior arched ridge. C, The inferior arched ridge. Under the arches are prints made by the muscles of the neck. DD, The two condyloid process which articulate the head with the spine. EE, The condylar process. FF, The foramen magnum through which the spinal marrow passes. GG, The posterior condyloid foramina which transmit veins into the lateral sinuses. HH, The foramina lingualia for the passage of the nine pairs of nerves.

Fig. 22. The Internal Surface of the Os Occipitus.
A A, The two sides which affix to form the lambdoid future. B, The point of the unciform process, where it joins the sphenoid bone. CC, The prints made by the posterior lobes of the brain. DD, Prints made by the lobes of the cerebellum. EE, The cruciform ridge for the attachment of the proccixus of the dura mater. FF, The course of the inferior longitudinal sinus. GG, The course of the two lateral sinus. HH, The foramen magnum. II, The posterior condyloid foramina.

Fig. 1. A Side-view of the Skeleton.

Fig. 2. A View of the Internal Surface of the Base of the Skull.

Fig. 3. A View of the External Surface of the Base of the Skull.
A, The two denis incisiformes of the right side. BB, The dens caninus. CC, The two small molares. DD, The three large molares. EE, The foramen incisiformum, which gives passage to small blood-vessels and nerves. FF, The palate-
ANATOMY.

Fig. 9. The internal surface of the right Os Unguis.  
This side of the bone has a narrow opposite to the external ridge; all behind this is irregular, where it covers part of the ethmoidal cells.

Fig. 10. The external surface of the left Os Male.  

Fig. 11. The internal surface of the left Os Male.  

Fig. 12. The external surface of the right Os Spongiosum Inferius.  

Fig. 13. The internal surface of the Os Spongiosum Inferius.  

Fig. 14. The posterior and external surface of the right Os Palati.  

Fig. 15. The interior and external surface of the right Os Palati.  

Fig. 16. The right side of the Vomer.  
A, The upper edge which joins the nasal lamella of the ethmoid bone and the middle cartilage of the nose.  B, The inferior edge, which is connected to the superior maxillary and palate bones.  C, The superior and posterior part which receives the processus azygos of the sphenoid bone.

Fig. 17. The Maxilla Inferior.  

Fig. 18. The different classes of the Teeth.  
1, 2, A fore and back view of the two anterior dentes incisores of the lower jaw.  3, 4, Similar teeth of the upper jaw.  5, 6, A fore and back view of the dentes canini.  7, 8, The anterior dentes molares.  9, 10, 11, The posterior dentes molares.  12, 13, 14, 15.
Of the inferior part of the bones of the right foot.


Fig. 10. The inferior surface of the two large sesamoid bones, at the first joint of the great toe.

Fig. 11. The superior view of the bones of the right foot.

A, B, as in Fig. 9. C, The superior head of the articular surface. D, &c. as in Fig. 9.

Fig. 12. The view of the sole of the foot, with its ligaments.


Fig. 14. The back-view of the cartilages of the larynx, with the os hyoideus.

ANATOMY.

Part II.

Of the Common Integuments, with their Appendages; and of the Muscles.

ANATOMICAL writers usually proceed to a description of the muscles after having finished the osteology: but we shall deviate a little from the common method, with a view to describe every thing clearly and distinctly, and to avoid a tautology which would otherwise be unavoidable. All the parts of the body are so intimately connected with each other, that it seems impossible to convey a just idea of any one of them, without being in some measure obliged to say something of others; and on this account we wish to mention in this place the names and situation of the principal viscera of the body, that when mention is hereafter made of any one of them in the course of the work, the reader may at least know where they are placed.

After this little digression, the common integuments, and after them the muscles will be described; we then propose to enter into an examination of the several viscera, and their different functions. In describing the brain, occasion will be taken to speak of the nerves and animal spirits. The circulation of the blood will follow the anatomy of the heart, and the secretions and excretions of all other matter will be introduced in their proper places.

The body is divided into three great cavities. Of these the uppermost is formed by the bones of the cranium, and includes the brain and cerebellum.

The second is composed of the vertebræ of the back, the sternum, and true ribs, with the additional assistance of muscles, membranes, and common intumens, and is called the thorax—It contains the heart and lungs.

The third and inferior cavity is the abdomen. It is separated from the thorax by means of the diaphragm, and is formed by the lumbar vertebrae, the os sacrum, the osa innominata, and the false ribs, to which we may add the peritoneum, and a variety of muscles. This cavity incloses the stomach, intestines, omentum, liver, pancreas, spleen, kidneys, urinary bladder, and parts of generation.

Under the division of common intumens are usually included the epidermis, or scarf-skin, the reticulum mucous of Malpighi, the cutis, or true skin, and the membrana adiposa—The hair and nails, as well as the sebaceous glands may be considered as appendages to the skin.

Section I. Of the Skin.

I. Of the Scarf-skin.

Cuticula. The epidermis, cuticula, or scarf-skin, is a fine, transparent, and insensible pellicle, destitute of nerves and blood-veins, which invests the body, and every where covers the true skin. This scarf-skin, which seems to be very simple, appears, when examined with a microscope, to be composed of several laminae or scales which are increased by pressure, as we may observe in the hands and feet, where it is frequently much thickened, and becomes perfectly callous. It seems to adhere to the cuts by a number of very minute filaments, but may easily be separated from it by heat, or by maceration in water. Some anatomical writers have supposed that it is formed by a moisture exhaled from the whole surface of the body, which gradually hardens when it comes into contact with the air. They were perhaps induced to adopt this opinion, by observing the speedy regeneration of this part of the body when it has been by any means destroyed, it appearing to be renewed on all parts of the surface at the same time; whereas other parts which have been injured, are found to direct their growth from their circumference only towards their centre. But a demonstrative proof that the epidermis is not a fluid hardened by means of the external air, is that the fetus in utero is found to have this covering. Lieuwenhoeck supposed its formation to be owing to the expansion of the extremities of the excretory vessels which are found every where upon the surface of the true skin. Ruysch attributed its origin to the nervous papillæ of the skin; and Heister thinks it probable, that it may be owing both to the papillæ and the excretory vessels. The celebrated Morgagni, on the other hand, contends, that it is nothing more than the surface of the cutis, hardened and rendered insensible by the liquor amni covers the umbilicus in utero, and by the insensible perspiration of the air. This is a subject, however, on which we can advance nothing with certainty.

The cuticle is pierced with an infinite number of pores or little holes, which afford a passage to the hairs, sweat, and insensible perspiration, and likewise to warm water, mercury, and whatever else is capable of being taken in by the absorptions of the skin. The lines which we observe on the epidermis belong to the true skin. The cuticle absorbs itself to them, but does not form them.

II. Of the Reticulum mucosum.

Between the epidermis and cutis we meet with an appearance to which Malpighi, who first described it, gave the name of reticulum mucosum, supposing it to be of a membranous structure, and pierced with an infinite number of pores; but the fact is, that it seems to be nothing more than a mucous substance which may be disdolled by macerating in water, while the cuticle and cutis preserve their texture.
The colour of the body is found to depend on the
colour of this rete mucosum: for in negroes it is ob-
served to be perfectly black, whilst the true skin is of
the ordinary colour.

The blisters which raise the skin when burnt or
scalded, have been suppos'd by some to be owing to a
rarefaction of this mucous; but they are more proba-
bly occasioned by an increased action of the vessels of
the part, together with an afflux and effusion of the
thinner parts of the blood.

§ 3. Of the Cutis, or True Skin.

The cutis is composed of fibres closely compac
ted together, as we may observe in leather, which is the
prepared skin of animals. These fibres form a thick net-
work, which everywhere admits the filaments of nerves,
and an infinite number of blood-vessels and lymphatics.

The cutis, when the epidermis is taken off, is found to
have, throughout its whole surface, innumerable papil-
lae, which appear like very minute granulations, and
seem to be calculated to receive the impressions of the
touch, being the most easily observable where the
sense of feeling is the most delicate, as in the palms of
the hands and on the fingers.

These papillæ are suppos'd by many anatomical writers
to be continuations of the pulpy substance of nerves,
which coats have terminated in the cellular texture of
the skin. The great freblility of these papillæ evidently
proves them to be exceedingly nervous; but surely the
nervous fibrillæ of the skin are of themselves scarcely
equal to the formation of these papillæ, and it seems to be more probable that they are formed like the
rest of the cutis.

The cutis being described, the uses of the epidermis and
the reticulum mucosum will be more easily under-
stood; the latter serving to keep them constantly moist,
while the former protects them from the external
air, and modifies their too great freblility.

§ 4. Of the Glands of the Skin.

In different parts of the body we meet, within the
substance of the skin, with certain glands or follicles,
which discharge a fat and oily humour that serves to
lubricate and soften the skin. When the fluid they se-
crete has acquired a certain degree of thickness, it ap-
proaches to the colour and consistence of sweat; and
from this appearance they have derived their name of
sebaceous glands. They are found in the greatest num-
ber in the nose, ear, nipple, axilla, groin, scrotum,
vagina, and prepuce.

Besides these sebaceous glands, we read, in anatomical
books, of others that are described as small spherical
bodies placed in all parts of the skin, in much greater
abundance than those just now mentioned, and named
miliary, from their suppos'd resemblance to millet-
seed. Steno, who first described these glands, and Mal-

pighi, Ruyfch, Verheyen, Winslow, and others, who
have adopted his opinions on this subject, speak of them
as having excrementory ducts, that open on the surface of
the cuticle, and distil the sweat and matter of infensible
perspiration; and yet, notwithstanding the positive
manner in which these pretend'd glands have been
spoken of, we are now sufficiently convinced that
their existence is altogether imaginary.

5. Of the Insensible Perpiration and Sweat.

The matter of insensible perspiration, or in other
words, the subtile vapour that is continually exhaling
from the surface of the body, is not secreted by any
particular glands, but seems to be derived wholly from
the extremities of the minute arteries that are every
where dispersed through the skin. These exhalving
vessels are easily demonstrated in the dead subject, by
throwing water into the arteries; for then small drops
evade from all parts of the skin, and raise up the cuti-
tle, the pores of which are closed by death; and in
the living subject, a looking-glass placed against the
skin, is soon obscured by the vapour. Blichio fancied
he had discovered ducts leading from the cutis to the
cuticle, and transmitting this fluid; but in this he was
mistaken.

When the perspiration is by any means increased,
and several drops that were insensible when separate,
are united together and condens'd by the external
air, they form upon the skin small, but visible, drops called
fuscat (n). This particularly happens after much ex-
ercise, or whatever occasions an increased determina-
tion of fluids to the surface of the body; a greater quan-
tity of perspirable matter being in such cases carried
through the passages that are destined to convey it off.

It has been disputed, indeed, whether the insensible
perspiration and sweat are to be considered as one and
the same excretion, differing only in degree; or whether
they are two distinct excretions derived from different
sources. In support of the latter opinion, it has been
alleged, that the insensible perspiration is agreeable to
nature, and essential to health, whereas sweat may be
considered as a species of disease. But this argument
proves nothing; and it seems probable, that both the
insensible vapour and the sweat are exhaled in a simi-
lar manner, though they differ in quantity, and proba-
bly in their qualities; the former being more limpid,
and seemingly less impregnated with salts than the lat-
ter; at any rate we may consider the skin as an emic-
tory through which the redundant water, and sometimes
the other more saline parts of the blood, are carried off.

But the insensible perspiration is not confined to the
skin only—a great part of what we are constantly
throwing off in this way is from the lungs. The quan-
tity of fluid exhaled from the human body by this in-
sensible perspiration is very considerable. Sancorius (o)
an Italian physician, who indefatigably puffed a great

(n) Lienwenboeck affers that one drop of sweat is formed by the conflux of fifteen drops of persipible
vapour.

(o) The insensible perspiration is sometimes distinguished by the name of this physician, who was born in
the territories of Venice, and was afterwards a professor in the university of Padua. After estimating the ailm-
ment he took in, and the sensible secretions and discharges, he was enabled to ascertain with great accuracy the
weight or quantity of insensible perspiration by means of a flatical chair which he contriv'd for this purpose;
Part II.

ANATOMY.

Of the many years in a series of statical experiments, demonstrated long ago what has been confirmed by later observations, that the quantity of vapour exhaled from the skin and from the surface of the lungs, amounts nearly to 5ths of the aliment we take in. So that if in the warm climate of Italy a person eats and drinks the quantity of eight pounds in the course of a day, five pounds of it will pass off by insensible perpiration, while three pounds only will be evacuated by stool, urine, saliva, &c. But in countries where the degree of cold is greater than in Italy, the quantity of perspired matter is less, in some of the more northern climates, it being found not to equal the discharge by urine. It is likewise observed to vary according to the season of the year, and according to the constitution, age, sex, diseases, diet, exercise, passion, &c. of different people.

From what has been said on this subject, it will be easily conceived, that this evacuation can be either much increased or diminished in quantity without affecting the health.

The perspirable matter and the sweat are in some measure analogous to the urine, as appears from their taste and falling nature. And it is worthy of observation, that when either of the secrections is increased in quantity, the other is diminished; so that they who perspire the least, usually pass the greatest quantity of urine, and vice versa.

§ 6. Of the Nails.

The nails are of a compact texture, hard and transparent like horn. Their origin is still a subject of dispute. Malpighi supposed them to be formed by a continuation of the papilla of the skin; Ludwig, on the other hand, maintained, that they were composed of the extremities of blood-vessels and nerves; both these opinions are now deservedly rejected.

They seem to possess many properties in common with the cuticle; like it they are neither vascular nor sensitive, and when the cuticle is separated from the true skin by maceration or other means, the nails come away without a trace.

They appear to be composed of different layers, of unequal size, applied one over the other. Each layer seems to be formed of longitudinal fibres.

In each nail we may distinguish three parts, viz. the root, the body or middle, and the extremity. The root is soft, thin, and white substance, terminating in the form of a crescent; the epidermis adheres very strongly to this part; the body of the nail is broader, of the redder, and thicker; and the extremity is of still greater firmness.

The nails increase from their roots, and not from their upper extremity.

Their principal use is to cover and defend the ends of the fingers and toes from external injury.

§ 7. Of the Hair.

The hairs, which from their being generally known, do not seem to require any definition, arise from distinct capsules or bulbs seated in the cellular membrane under the skin. Some of these bulbs inclose several hairs. They may be observed at the roots of the hairs which form the beard or whiskers of a cat.

The hairs, like the nails, grow only from below by a regular propulsion from their root, where they receive their nourishment. Their bulbs, when viewed with a microscope, are found to be of various shapes. In the head and forehead they are roundish; in the eyebrows they are oval; and in other parts of the body they are nearly of a cylindrical shape. Each bulb seems to consist of two membranes, between which there is a certain quantity of moisture. Within the bulb the hair separates into three or four filaments; the bodies of the hairs, which are the parts without the skin, vary in softness and colour according to the difference of climate, age, or temperance of body.

Their general use in the body does not seem to be absolutely determined; but hairs on particular parts, as on the eyebrows and eyelids, are declined for particular uses, which will be mentioned when those parts are described.

§ Of the Cellular Membrane and Fat.

The cellular membrane is found to invest the most minute fibres we are able to trace; so that by modern physiologists, it is very properly considered as the universal connecting medium of every part of the body.

It is composed of an infinite number of minute cells united together, and communicating with each other. The two diseases peculiar to this membrane are proofs of such a communication; for in the emphysema all its cells are filled with air, and in the anaes (a) they are universally diffused with water. Besides these proofs of communication from disease, a familiar instance of it may be observed among butchers, who usually puncture this membrane, and by infusing it with air add to the good appearance of their meat.

and from his experiments, which were conducted with great industry and patience, he was led to determine what kinds of solid or liquid aliment increased or diminished it. From these experiments he formed a system, which he published at Venice in 1672, in the form of aphorisms, under the title of "Ars de Medicina Statica." 

(p) Minute chrysalids have been observed to shoot upon the cloaths of men who work in glass-houses. 

(q) Malpighi, and after him the celebrated Ruych, supposed the hairs to be continuations of nerves, being of opinion that they originated from the papilla of the skin, which they considered as nervous; and as a corroborating proof of what they advanced, they argued the pain we feel in plucking them out; but later anatomists seem to have rejected this doctrine, and consider the hairs as particular bodies, not arising from the papilla for in the parts where the papilla abound mol there are no hairs), but from bulbs or capsules, which are peculiar to them.

(a) The hairs likewise differ from each other, and may not improperly be divided into two classes; one of which may include the hair of the head, chin, pubes, and axillae; and the other, the softer hairs, which are to be observed almost everywhere on the surface of the body.
The cells of this membrane serve as reservoirs to the oily part of the blood or Fat, which seems to be deposited in them, either by transudation through the coats of the arteries, that ramify through these cells, or by particular vessels, continued from the end of arteries. These cells are not of a glandular structure, as Malpighi and others after him have supposed. The fat is absorbed and carried back into the system by the lymphatics. The great waste of it in many dis ease, particularly in the consumption, is a sufficient proof that such an absorption takes place.

The fulness and size of the body are in a great measure proportioned to the quantity of fat contained in the cells of this membrane.

In the living body it seems to be a fluid oil, which concretes after death. In graminivorous animals, it is found to be of a firmer consistence than in man.

The fat is not confined to the skin alone, being met with everywhere in the interfices of muscles, in the subcutaneous coats about the kidneys, at the base of the heart, in the orbit, &c.

The chief uses of the fat seems to be to afford moisture to all the parts with which it is connected; to facilitate the action of the muscles; and to add to the beauty of the body, by making it everywhere smooth and equal.

Sect. II. Of the Muscles.

The muscles are the organs of motion. The parts that are usually included under this name consist of distinct portions of flesh, susceptible of contraction and relaxation; the motions of which, in a natural and healthy state, are subject to the will, and for this reason they are called voluntary muscles. But besides these, there are other parts of the body that owe their power of contraction to their muscular fibres; thus the heart is of a muscular texture, forming what is called a hollow muscle; and the urinary bladder, stomach, intestines, &c. are enabled to act upon their contents, merely because they are provided with muscular fibres. These are called involuntary muscles, because their motions are not dependent on the will. The muscles of respiration, being in some measure influenced by the will, are said to have a mixed motion.

The names by which the voluntary muscles are distinguished, are, according to their size, figure, situation, use, or the arrangement of their fibres, or their origin and insertion. But besides these particular distinctions, there are certain general ones that require to be noticed. Thus, if the fibres of a muscle are placed parallel to each other in a straight direction, they form what is styled a rectilinear muscle; if the fibres cross and intersect each other, they constitute a compound muscle; a radiated one, if the fibres are disposed in the manner of rays; or a penniform muscle, if, like the plume of a pen, they are placed obliquely with respect to the tendon.

Muscles that act in opposition to each other, are called antagonists; thus every extensor or muscle has a flexor for its antagonist, and vice versa. Muscles that concur in the same action are styled congenerous.

The muscles being attached to the bones, the latter may be considered as levers that are moved in different directions by the contraction of those organs.

The end of a muscle which adheres to the most fixed part is usually called the origin, and that which adheres to the more moveable part, the insertion, of the muscle.

In every muscle we may distinguish two kinds of fibres; the one soft, of a red colour, tender, and irritable, called flesh fibres; the other of a firmer texture, of a white glistening colour, insensible, without irritability or the power of contracting, and named tendinous fibres. They are occasionally intermixed; but the flesh fibres generally prevail in the belly or middle part of a muscle, and the tendinous ones in the extremities. If these tendinous fibres are formed into a round slender chord, they form what is called the tendon of the muscle; on the other hand, if they are spread into a broad flat surface, the extremity of the muscle is styled aponeurosis.

The tendons of many muscles, especially when they are long and exposed to pressure or friction in the grooves formed for them in the bones, are surrounded by a tendinous sheath or fascia, in which we sometimes find a small mucous sac or bursa muscula, which obviates any inconvenience from friction. Sometimes we find whole muscles, and even several muscles, covered by a fascia of the same kind, that affords origin to many of their fibres, dipping down between them, adhering to the ridges of bones, and thus preventing them from swelling too much when in action. The most remarkable instance of such a covering is the fascia lata of the thigh.

Each muscle is enclosed by a thin covering of cellular membrane, which has been sometimes improperly considered as peculiar to the muscles, and described under the name of propria membrana muscula. This cellular covering dips down into the substance of the muscle, connecting and surrounding the most minute fibres we are able to demonstrate, and affording a support to their vessels and nerves.

Lieuwenhoeck fancied he had discovered, by means of his microscope, the ultimate division of a muscle, and that he could point out the simple fibre, which appeared to him to be an hundred times less than a hair; but he was afterwards convinced how much he was mistaken on this subject, and candidly acknowledged, that what he had taken for a simple fibre was in fact a bundle of fibres.

It is easy to observe several of these fasciculi or bundles in a piece of beef, in which, from the clearness of its texture, they are very evident.

The red colour which so particularly distinguishes the muscular or fleshly parts of animals, is owing to an infinite number of blood-vessels that are dispersed through their sub stance. When we macerate the fibres of a muscle in water, it becomes of a white colour like all other parts of the body divested of their blood. The blood-vessels are accompanied by nerves, and they are both distributed in such abundance to these parts, that in endeavouring to trace the course of the blood-vessels in a muscle, it would appear to be formed altogether by their ramifications: and in an attempt to follow the branches of its nerves, they would be found to be equal in proportion.

If a muscle is pricked or irritated, it immediately contracts. This is called its irritable principle; and this...
Part II.

**ANATOMY.**

Of the

Muscles.

this irritability is to be considered as the characteristic of muscular fibres, and may serve to prove their existence in parts that are too minute to be examined by the eye. This power, which imparts to the muscles to contract when stimulated, independent of the will, is supposed to be inherent in them; and is therefore named *vis inïtis.* This property is not to be confounded with elatiçity, which the membranes and other parts of the body possess in a greater or less degree in common with the muscles; nor with sensibility, for the heart, though the most irritable, seems to be the least sensible of any of the muscular parts of the body.

After a muscular fibre has contracted, it soon returns to a state of relaxation, till it is excited afresh; and then it contracts and relaxes again. We may likewise produce such a contraction, by irritatiçg the nerve leading to a muscle, although the nerve itself is not affected.

This principle is found to be greater in small than in large, and in young than in old, animals.

In the voluntary muscles these effects of contraction and relaxation of the fleshy fibres are produced in obedience to the will, by what may be called the *vis nervosa,* a property that is not to be confounded with the *vis inïtis.* As the existence of a *vis inïtis* different from a *vis nervosa,* was the doctrine taught by Doctor Haller in his *Elem. Phys.* but is at present called in question by several, particularly Dr. Monro, we think it necessary to give a few objections, as stated in his Observations on the Nervous System:

"The chief experiment (says the Doctor,) which seems to have led Dr. Haller to this opinion, is the well-known one, that the heart and other muscles, after being detached from the brain, continue to act spontaneously, or by stimulis being roused into action for a considerable length of time; and when it cannot be alleged, says Dr. Haller, that the nervous fluid is by the mind, or otherwise, impelled into the muscle.

"That in this instance, we cannot comprehend by what means the nervous fluid or energy can be put in motion, must perhaps be granted: But has Dr. Haller given a better explanation of the manner in which his supposed *vis inïtis* becomes active?

"If it be as difficult to point out the cause of the action of the *vis inïtis* as that of the action of the *vis nervosa,* the admission of that new power, instead of relieving, would add to our perplexity.

"We should then have admitted, that two causes of a different nature were capable of producing exactly the same effect: which is not in general agreeable to the laws of nature.

"We should find other consequences arise from such an hypothesis, which tend to weaken the credibility of it. For instance, if in a found animal the *vis nervosa* alone produces the contraction of the muscles, we will ask what purpose the *vis inïtis* serves? If both operate, are we to suppose that the *vis nervosa,* impelled by the mind, or living principle, gives the order, which the *vis inïtis* executes, and that the nerves are the intermuntl? and so admit two wise agents employed in every the most simple act? But instead of speculating further, let us learn the effect of experiments, and endeavour from there to draw plain conclusions.

1. When I poured a solution of opium in water under the skin of a frog, the muscles, to the surface of which it was applied, were very soon deprived of the power of contraction. In like manner, when I poured this solution into the cavity of the heart, by opening the venæ cava, the heart was almost instantly deprived of its powers of action, whether the experiment was performed on it fixed in its place, or cut out of the body.

2. I opened the thorax of a living frog; and then tied or cut the aorta, so as to put a stop to the circulation of its blood.

I then opened the venæ cava, and poured the solution of opium into the heart; and found, not only that this organ was instantly deprived of its powers of action, but that in a few minutes the most distant muscles of the limbs were extremely weakened. Yet this weakness was not owing to the want of circulation, for the frog could jump about for more than an hour after the heart was cut out.

"In the first of these two experiments, we observed the supposed *vis inïtis* destroyed by the opium; in the latter, the *vis nervosa;* for it is evident that the limbs were affected by the sympathy of the brain, and of the nervous system in general, with the nerves of the heart.

3. When the nerve of any muscle is first divided by a transverse section, and then burnt with a hot iron, or punctured with a needle, the muscle in which it terminates contracts violently, exactly in the same manner as when the irritation is applied to the fibres of the muscle. But when the hot iron, or needle, is confined to the nerve, Dr. Haller himself must have admitted, that the *vis nervosa,* and not the *vis inïtis,* was excited. But here I would ask two questions.

"First, Whether we do not as well understand how this *vis nervosa* is excited when irritation is applied to the muscle as when it is applied to the trunk of the nerve, the impelling power over the mind seeming to be equally wanting in both cases?

"Secondly, If it appears that irritation applied to the trunk of a nerve excites the *vis nervosa,* why should we doubt that it can equally well excite it when applied to the small and very sensible branches and terminations of the nerve in the muscle?

"As, therefore, it appears that the supposed *vis inïtis* is destroyed or excited by the same means as the *vis nervosa;* nay, that when, by the application of opium to the heart of a frog, after the aorta is cut and the circulation interrupted, we have destroyed the *vis inïtis,* the *vis nervosa* is so much extinguished, that the animal cannot act with the distant muscles of the limb; and that these afterwards grow very torpid, or lose much of their supposed *vis inïtis*; it seems clearly to follow, that there is no just ground for supposing that any other principle produces the contraction of a muscle."

The *vis nervosa,* or operation of the mind, if we may so call it, by which a muscle is brought into contraction, is not inherent in the muscle like the *vis inïtis*; neither is it perpetual, like this latter property. After long continued or violent exercise, for example, the
Of the Integuments, &c.

Of the voluntary muscles become painful, and at length incapable of further action; whereas the heart and other involuntary muscles, the motions of which depend solely on the *vis in fissa*, continue through life in a constant state of action, without any inconvenience or waste of this inherent principle.

The action of the *vis nervosa* on the voluntary muscles, constitutes what is called *muscular motion*; a subject that has given rise to a variety of hypotheses, many of them ingenious, but none of them satisfactory.

Borelli and some others have undertaken to explain the cause of contraction, by supposing that every muscular fibre forms as it were the cause of the motion, which the nerves which are distributed through the muscles, bring with them a supply of animal spirits, which at our will fill these bladders, and by increasing their diameter in width, shorten them, and of course the whole fibre.

Borelli supposes these bladders to be of a rhomboidal shape; Bernouilli on the other hand contends that they are oval. Our countryman, Cowper, fancied he had filled them with mercury; the cause of this mistake was probably owing to the mercury’s insinuating itself into some of the lymphatic vessels. The late ingenious Mr. Elliot undertook to account for the phenomenon of muscular motion on principles very different from those just now mentioned. He supposed that a dephtlified state of the blood is requisite for muscular action, and that a communication of phlogiston to the blood is a necessary effect of such action.

We know that the muscular fibre is shortened, and that the muscle itself swells when in action; but how these phenomena are produced, we are unable to determine. We likewise know that the nerves are essential to muscular motion; for upon dividing or making a ligature round the nerve leading to a muscle, the latter becomes incapable of motion. A ligature made on the artery of a muscle produces a similar effect; a proof this, that a regular supply of blood is also equally necessary to muscular motion. The cause of palsy is usually not to be sought for in the muscle affected, but in the nerve leading to that muscle, or in that part of the brain or spinal marrow from which the nerve derives its origin.

Of the particular Muscles.

As the enumeration and description of the particular muscles must be dry and unentertaining to the generality of readers, yet cannot be altogether omitted in a work of this nature, it appeared eligible to throw this part of the subject into the form of a table; in which the name, origin, insertion, and principal use of each muscle, will be found described in few words, and occasionally its etymology when it is of Greek derivation or difficult to be understood.

A TABLE of the MUSCLES arranged according to their Situation.

[N. B. This table does not include all the muscles of the body; those belonging to the eyes, internal ear, intestines rectum, and the male and female organs of generation, being described in other parts of the work. The reader will be pleased to observe likewise, that although all the muscles (a few only excepted) are in pairs, mention is here made only of the muscles of one side.]

<table>
<thead>
<tr>
<th>Muscles Situated under the integuments of the cranium</th>
<th>Name</th>
<th>Origin</th>
<th>Insertion</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>of the eye-lids</td>
<td>1. Occipito frontalis. From the transverse into the skin of the ridge of the os occipitis.</td>
<td></td>
<td>Into the inner part</td>
<td>To pull the skin of the head backwards, and to raise the eye-brows and skin of the forehead.</td>
</tr>
<tr>
<td>of the external ear</td>
<td>1. Attolens auriculam. From the tendon of the upper part</td>
<td>To shut the eye of the orbit.</td>
<td>To open the eye.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Anterior auriculæ. From near the back into an eminence</td>
<td></td>
<td>To raise this eminence of the ear.</td>
<td></td>
</tr>
</tbody>
</table>

3. Re-
Part II. 

Muscles of the cartilages of the ear

1. Tragicus. From the outer and Into the upper part To depress the concha, and pull the point of the tragus a little outwards.

2. Anti-tragicus. From the root of the Into the upper part To dilate the mouth of the concha.

3. Transversus-auriculæ. From the upper part Into the inner part To stretch the concha and scapha, and likewise to pull the parts it is connected with towards each other.

4. Helicis major. From the upper, anterior, and acute part of the helix. Into the cartilage of the helix, a little above the tragus. To depress the upper part of the helix.

5. Helicis minor. From the lower and ante-part of the helix. Into the helix, near the fissure in its cartilage. To contract the fissure.

Muscles of the nose

1. Compressor (T) From the outer part Into the nasal process of the os maxillae. To straighten the nose, and to corrugate the skin of the nose.

2. Levator labii superioris, alæque nasi. From the outer part of the orbitar process of the os maxillaré, and from the nasal process of that bone, where it joins the os frontis. Into the upper lip and ala of the nose. To draw the upper lip and skin of the nose upwards and outwards.

3. Zygomaticus major. From the os maxillaré near the zygomatic future. Into the angle of the mouth. To raise the angle of the mouth, and make the cheek prominent, as in laughing.

4. Zygomaticus minor. Immediately above the origin of the zyg major. Into the angle of the mouth. To raise the angle of the mouth obliquely outwards.

5. Buccinator. From the alveoli of the dentes molares in the upper and lower jaws. Into the angle of the mouth. To contract the mouth and draw the angle of it outwards and backwards.

6. Depressor labii superioris, alæque nasi. From the os maxillaré. Into the root of the ala nasi and upper lip. To draw the ala nasi and upper lip downwards.

7. Depressor

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(s) These are three small tender muscles. The inferior one is sometimes wanting.

(r) The nose is affected by fibres of the occipito frontalis, and by several muscles of the face; but this pair, the compressores, is the only one that is proper to it.
ANATOMY.

Muscles of the lower jaw,

1. Temporalis.

From part of the os bregmatis and os frontis; squamous part of the os temporis; back part of the os male, and the temporal processes of the os sphenoides (v).

2. Masseter (w).

From the malar processes of the maxillare, and the lower edges of the os male, and of the zygomatic processes of the os temporis.

3. Pterygoideus internus.

From the inner surface of the outer wing of the pterygoid processes of the os sphenoides, and from the processes of the os palati that helps to form the pterygoid fossa.

4. Pterygoideus externus.

From the external ala of the pterygoid processes, a small part of the adjacent os maxillare, and a ridge in the temporal processes of the os sphenoides.

5. Orbicularis oris (u).

From near the gums of the incisores and caninus of the maxilla inferior.

6. Depressor anguli oris.

At the side of the chin from the lower edge of the maxilla inferior.

7. Depressor labii inferioris.

Into the angle of the mouth.

8. Levator labii superioris.

From near the gums of the incisores and caninus of the maxilla inferior.

9. Levator labii inferioris.

To draw the corner of the mouth downwards.

10. Orbicularis oris.

Into the coronoid processes of the lower jaw.

11. Levator labii superioris.

To raise the under lip and skin of the chin.

12. Orbicularis oris.

To move the lower jaw upwards.

13. Temporalis.

To raise and likewise to move the jaw a little forwards and backwards.


Into the lower jaw on its inner side and near its angle.

15. Latissimus colli (v).

From the cellular membrane covering the chin and integument of the face.

(v) This muscle is, in a great measure, if not wholly, formed by the buccinator, zygomatici, depressores, and other muscles that move the lips. Its fibres surround the mouth like a ring.

(w) Some of its fibres likewise have their origin from a strong fascia that covers the muscle and adheres to the bone round the whole circumference of its origin. When we remove this covering, we find the muscle of a semicircular shape with its radiated fibres, converging and forming a strong middle tendon.

(x) This happens when the muscle acts singly. When both act, the jaw is brought horizontally forwards.

(y) This broad and thin muscular expansion, which is situated immediately under the common integuments, is by Winlock named meusculus cutaneus. Galen gave it the name of m. zygomaticus (Platymanymides); the etymology of which is from διατιτομή, dilatatio, and μύς, muscularis, and φώνα, forma.
<table>
<thead>
<tr>
<th>Muscles situated between the trunk and the os hyoides</th>
<th>Name</th>
<th>Origin</th>
<th>Insertion</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Omo-hyoideus (a)</td>
<td>From the upper cost of the scapula near its niche, from part of a ligament that extends across this niche, and sometimes by a few fibres, from the coracoid process.</td>
<td>Into the basis of the os hyoides.</td>
<td>To draw the os hyoides downwards.</td>
<td></td>
</tr>
<tr>
<td>2. Sterno-hyoideus</td>
<td>From the cartilage of the first rib, the inner and upper part of the sternum, and a small part of the clavicle.</td>
<td>Into the basis of the os hyoides.</td>
<td>To draw the os hyoides downwards.</td>
<td></td>
</tr>
<tr>
<td>3. Hyo-thyroideus</td>
<td>From the part of the basis and horn of the os hyoides.</td>
<td>Into a rough oblique line at the side of the thyroid cartilage.</td>
<td>To raise the thyroid cartilage, or depress the os hyoides.</td>
<td></td>
</tr>
<tr>
<td>4. Sterno-thyroideus</td>
<td>From between the cartilages of the first and second ribs at the upper and inner part of the sternum.</td>
<td>Immediately under the hyo-thyroideus.</td>
<td>To pull the thyroid cartilage downwards.</td>
<td></td>
</tr>
<tr>
<td>5. Crico-thyroideus</td>
<td>From the anterior part and side of the cricoid cartilage.</td>
<td>Into the lower part and inferior horn of the thyroid cartilage.</td>
<td>To pull the cricoid cartilage upwards and backwards, or the thyroid forwards and downwards.</td>
<td></td>
</tr>
</tbody>
</table>

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### Situated between the os hyoides and lower jaw
1. Diaphragmaticus (b) | From the fossa of the root of the mastoid process, and likewise from the os hyoides. | Into the lower and anterior part of the chin. | To draw the lower jaw downwards. |
2. Stylo-hyoideus (c) | From the basis of the styloid process. | Into the side and fore part of the os hyoides near its base. | To draw the os hyoides obliquely upwards. |

### Notes

- **(z)** This, on account of its two origins, is by Albinus described as two distinct muscles, which he names *sterno-mastoideus* and *cleido-mastoideus*.
- **(a)** This muscle does not always arise from the coracoid process, it seems to have been improperly named *coraco-hyoideus* by Douglas and Albinus. Winlow calls it *omo-hyoideus*, on account of its general origin from the scapula.
- **(b)** From *diaphragma* (biventer), because it has two fleshly bellies with a middle tendon. This tendon passes through the stylo-hyoideus.
- **(c)** In some subjects we meet with another muscle, which from its having nearly the same origin, insertion, and use as this, has been named *stylo-hyoideus alter*. 
### Of the Muscles.

#### Part II.

#### Of the Muscles.

<table>
<thead>
<tr>
<th>Name</th>
<th>Origin</th>
<th>Insertion</th>
<th>Uso</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Mylo-hyoideus (d)</td>
<td>From the inside of the lower jaw, between the last dens molaris and the chin.</td>
<td>Into the basis of the os hyoides.</td>
<td>To move the os hyoides to either side, forwards or upwards.</td>
</tr>
<tr>
<td>4. (e) Genio-hyoideus</td>
<td>From the inside of the chin.</td>
<td>Into the base of the os hyoides.</td>
<td>To move the os hyoides forwards or upwards.</td>
</tr>
<tr>
<td>5. Genio-glossus</td>
<td>From the inside of the chin.</td>
<td>Into the tongue and basis of the os hyoides.</td>
<td>To move the tongue in various directions.</td>
</tr>
<tr>
<td>6. Hyo-glossus (v)</td>
<td>From the horn, basis, and appendix of the os hyoides.</td>
<td>Into the tongue laterally.</td>
<td>To draw the tongue downwards and inwards.</td>
</tr>
<tr>
<td>7. Lingualis</td>
<td>Lateral from the root of the tongue.</td>
<td>Into the extremity of the tongue.</td>
<td>To shorten the tongue and draw it backwards.</td>
</tr>
<tr>
<td>8. Stylo-glossus</td>
<td>From the mylohyoid process, and sometimes also from a ligament that extends from thence to the angle of the lower jaw.</td>
<td>Into the side of the tongue from the root of its tip.</td>
<td>To move the tongue backwards and to one side.</td>
</tr>
<tr>
<td>9. Stylo-pharyngaeus</td>
<td>From the basis of the mylohyoid process.</td>
<td>Into the side of the pharynx and posterior part of the thyroid cartilage.</td>
<td>To raise the thyroid cartilage and pharynx, and likewise to dilate the latter.</td>
</tr>
<tr>
<td>10. Circumflexus-palati</td>
<td>From near the bony part of the Eustachian tube, and from the spinous processes of the os sphenoides.</td>
<td>Into the femilunar edge of the os palatii and the velum pendulum palati.</td>
<td>To dilate and draw the velum obliquely downwards.</td>
</tr>
<tr>
<td>11. Levator palati</td>
<td>From the membranous part of the Eustachian tube, and the extremity of the os petrosum.</td>
<td>Into the velum pendulum palati.</td>
<td>To pull the velum backwards.</td>
</tr>
</tbody>
</table>

**Muscles situated about the fauces,**

<table>
<thead>
<tr>
<th>Name</th>
<th>Origin</th>
<th>Insertion</th>
<th>Uso</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Palato-pharyngeus</td>
<td>From the lower and anterior part of the cartilaginous extremity of the Eustachian tube (v); the tendinous expansion of the circumflexus palati; and the velum pendulum palati near the basis and black part of the uvula.</td>
<td>Into the upper and posterior part of the thyroid cartilage.</td>
<td>To raise the pharynx and thyroid cartilage, or to pull the velum and uvula backwards and downwards.</td>
</tr>
</tbody>
</table>

---

(d) So named from its arising near the dentes molares (molar), and being inserted into the os hyoides.

(e) From *mentum*, the "chin."

(v) From *corpus*, *cornu*, and *lingua*, "the tongue."

(c) This muscle in its course forms a round tendon, which, after passing over a kind of hook formed by the inner plate of the pterygoid process of the sphenoid bone, expands into a tendinous membrane.

(u) The few fibres that arise from the Eustachian tube are described as a distinct muscle by Albinus, under the name of Salpingo pharyngus. They serve to dilate the mouth of the tube.

---

**Constrictor**
ANATOMY.

Of the Muscles.

Part II.

Name. Origin. Insertion. Use.

2. Constrictor larynx. From near the bals. of the tongue laterally. Into the velum pendentulum palatii, near the bals and fore part of the uvula. To raise the tongue and draw the velum towards it. (1).

3. Azygos uvula. From the end of the future that units the soft palatii. Into the extremity of the uvula. To shorten the uvula, and bring it forwards and upwards.

Muscles at the back part of the pharynx

1. Constrictor pharyngis superior. From the cuneiform process of the occipital bone; the pterygoideus os sphenoides, and from each jaw near the last dens molares (k).

Into the middle of the pharynx. To move the pharynx upwards and forwards, and to compress its upper part.

2. Constrictor pharyngis medius (l).

From the horn and appendix of the os hyoïdes, and from the ligament that unites it with the thyroid cartilage.

Into the middle of the pharynx. To draw the os hyoïdes and pharynx upwards, and to compress the latter, near the extremity of it is connected with the other arytenoid cartilage.

3. Constrictor pharyngis inferior (m).

From the cricoid and thyroid cartilages.

Into the middle of the pharynx. To compress part of the pharynx.

Muscles about the glottis.

1. Arytrenoideus transversus. From the side of the cricoid cartilage.

Into the basis of the arytenoid cartilage laterally. To open the glottis.

2. Arytrenoideus posticus.

From the cricoid cartilage posteriory.

Into the basis of the arytenoid cartilage posteriory. To open the glottis.

3. Arytænoides obliquus.

From the basis of one of the arytenoid cartilages.

Near the extremity of the arytenoid cartilage. To shut the glottis.

4. Arytænoides transversus.

From one of the arytenoid cartilages laterally.

Into the other arytenoid cartilage laterally. To pull the epiglottis outwards.

5. Thyreo-arytænoides.

From the posterior and under part of the thyroid cartilage.

Into the arytenoid cartilage laterally. To draw the arytenoid cartilage forwards.

6. Arytænepiglot- tideus.

From the upper part of the arytenoid cartilage laterally.

Into the side of the epiglottis. To move the epiglottis outwards.

7. Thyreoepiglottideus.

From the thyroid cartilage. Into the side of the epiglottis. To pull the epiglottis obliquely downwards (n).

Muscles

(1) This muscle, and the palato-pharyngæus, likewise serve to close the passage into the fauces, and to carry the food into the pharynx.

(k) The three orders of fibres here mentioned, with a few others derived from the tongue, have given occasion to Douglas to describe them as four distinct muscles, under the names of cephalo-pharyngæus, mylo-pharyngæus, ptery-pharyngæus, and glotto-pharyngæus.

(l) Douglas makes two muscles of this, the hypo-pharyngæus and stylopharyngæus.

(m) The crico-pharyngæus and thyro-pharyngæus of Douglas.

(n) When either this or the preceding muscle acts with its fellow, the epiglottis is drawn directly downwards upon the glottis.
ANATOMY.

Part II.

Muscles at the fore part of the neck, close to the vertebrae.

<table>
<thead>
<tr>
<th>Name</th>
<th>Origin</th>
<th>Insertion</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rectus capitis internus major</td>
<td>From the anterior extremities of the transverse processes of the five lowermost cervical vertebrae</td>
<td>Into the fore part of the cuneiform processes of the os occipitis</td>
<td>To bend the head forwards</td>
</tr>
<tr>
<td>Rectus capitis internus minor</td>
<td>From the anterior and upper part of the first cervical vertebra</td>
<td>Near the basis of the described muscle</td>
<td>To assist the last described muscle</td>
</tr>
<tr>
<td>Rectus capitis lateralis</td>
<td>From the anterior and upper part of the transverse processes of the first and second dorsal vertebrae, and of the last cervical vertebra; and, lastly, from the anterior extremities of the transverse processes of the 6th, 5th, 4th, and 3rd cervical vertebrae</td>
<td>Into the os occipitis, opposite to the stylo-mastoid foramen</td>
<td>Move the head to one side</td>
</tr>
<tr>
<td>Longus colli.</td>
<td>Within the thorax, laterally from the bodies of the three uppermost dorsal vertebrae, from the basis and fore part of the transverse processes of the first and second dorsal vertebrae, and of the last cervical vertebra; and, lastly, from the anterior extremities of the transverse processes of the 6th, 5th, 4th, and 3rd cervical vertebrae</td>
<td>Into the second cervical vertebra anteriorly</td>
<td>To pull the neck to one side (o)</td>
</tr>
</tbody>
</table>

1. Obliquus externus. From the lower edges of the eight inferior ribs, near their cartilages | Into the linea alba | To compress and support the viscera, assist in evacuating the faces and urine, draw down the ribs, and bend the trunk forwards, or obliquely to one side (p)

2. Obliquus internus. From the spinoous processes of the three lowermost lumbar vertebrae: Into the cartilages of all the false ribs, externus. linea alba (s), and...
| **Part II.** | **ANATOMY.** |  |
| **Of the Muscles.** | **Name.** | **Origin.** | **Insertion.** | **Use.** | **Of the Muscles.** |
| | | vertebrae, the back part of the os sacrum, the spine of the ilium, and back part of Fallopius's ligament (r). | | | |
| | 3. Transversalis. | From the cartilages of the seven inferior ribs; the transverse processes of the last dorsal, and four upper lumbar vertebrae; the inner part of Fallopius's ligament and the spine of the ilium. | Into the linea alba and cartilago eniformis. | To compress the abdominal viscera. | |
| | 4. Rectus abdominis. | From the upper edge of the pubis and the symphysis pubis. | Into the cartilages of the 5th, 6th, and 7th ribs, and the edge of the cartilago eniformis (w). | To compress the fore part of the abdomen, and to bend the trunk forwards. | |
| | 5. Pyramidalis (v). | From the anterior and upper part of the pubis. | Into the linea alba and inner edge of the rectus, commonly about two inches above the pubis. | To assist the lower portion of the rectus. | |

**Muscles at the fore part of the thorax.**

1. **Pectoralis Major.** From the cartilages of the 5th and 6th ribs, the sternum, and anterior part of the clavicle. Into the upper and inner part of the os humeri (w). To draw the arm forwards or obliquely forwards.

2. **Subclavius.** From the cartilage of the first rib. Into the under surface of the clavicle. To move the clavicle forwards and downwards and to assist in raising the first rib.

3. **Pectoralis minor (x).** From the upper edges of the 3d, 4th and 5th ribs. Into the coracoid process of the scapula. To move the scapula forwards and downwards or to elevate the ribs.

4. **Serratus Magnus.** From the eight superior ribs. Into the basis of the scapula. To bring the scapula forwards.

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(t) From this part it detaches some fibres which extend downwards upon the spermatic chord, and from what is described as the cremaster muscle.

(v) The fibres of the rectus are generally divided by three tendinous interseions. The two upper thirds of this muscle passing between the tendinous layers of the obliquus internus, are inclosed as it were in a sheath; but at its lower part we find it immediately contiguous to the peritoneum, the inferior portion of tendon of the transversalis passing over the rectus, and adhering to the anterior layer of the obliquus internus.

(v) This muscle is sometimes wanting.

(w) The fibres of this muscle pass towards the axilla in a folding manner, and with those of the latissimus dorsi from the armpit.

(x) This and some other muscles derive their name of serratus, from their arising from a number of tendinous or bony digitations, resembling the teeth of a saw (ferra).
ANATOMY.

---
1. Diaphragma (v). From the transverse processes of the last cervical and the eleven upper dor- To move the ribs up- wards and outwards. thobery.
2. Levatores costarum. From the lower edge of each upper rib. Into the superior edge To elevate the ribs.
3. Intercoifales externi. From the lower edge of each lower rib. Into the cartilages of To depress the carti- Siformis, and lower legs of the ribs.
4. Intercoifales interni (A). From the cartilage of each upper rib. Into the cartilage of each lower rib. To elevate What.
5. Sterno-coifales (B). From the cartilage of the 2d, 3d, 4th, 5th, and 6th ribs. Into the cartilage of the 2d, 3d, 4th, 5th, and 6th ribs. To depress the carti- Siformis, and lower legs of the ribs.

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1. Trapezius (c) or From the middle of the half of the clavicle, and the spine of the acromion, and the spine of the scapula. To move the scapula. 
2. Rhomboideus (s). From the spinous processes of the three lowermost cervical, and of all the dor- To move the scapula. upwards and backwards.
3. Latifmmus dorsi. From part of the spinous of the 1st, the spinous processes of the 2nd, 3rd, 4th, and of six or eight of the dor- To draw the scapula downwards and backwards, and to roll it upon its axis.

---

(v) For a description of the diaphragm, see Part IV. Sect. IV.

(A) The origin, insertion, and use of the internal intercostals, are similar to those of the external. The reader, however, will be pleased to observe, that the intercostals externi occupy the spaces between the ribs only from their spine to their cartilages; from thence to the sternum, there being only a thin membrane, which is spread over the intercostals interni; and that the latter, on the contrary, extend only from the sternum to the angles of each rib.

The fibres of the external muscles run obliquely forwards; those of the internal obliquely backwards. This difference in the direction of their fibres induced Galen to suppose that they were intended for different uses; that the external intercostals, for instance, serve to elevate, and the internal ones to depress the ribs. Fallopius seems to have been the first who ventured to dispute the truth of this doctrine, which has since been revived by Boyle, and more lately still by Hamberger, whose theoretical arguments on this subject have been clearly refuted by the experiments of Haller.

(b) These consist of four, and sometimes five distinct muscles on each side. Vesalius, and after him Douglas and Albinus, consider them as forming a single muscle, which, on account of its shape, they name triangularis. Verheyen, Winstow, and Haller, more properly describe them as so many separate muscles, which, on account of their origin and insertion they name sternocostal.

(c) So named by Riolanus, from its quadrilateral shape. Columbus and others gave it the name of cuculare, from its resemblance to a monk's hood.

(d) The tendinous fibres of this muscle, united with those of its fellow in the nape of the neck, from what is called the ligamentum colli.

(b) This muscle consists of two distinct portions, which are described as separate muscles by Albinus, under the names of rhomboideus minor and rhomboideus major.
4. Serratus inferior posticus. From the spinous processes of the two lowermost dorsal, and of three of the lumbar vertebrae. Into the lower edges of the three or four lowermost ribs near their cartilages. To draw the ribs outwardly, downwards, and backwards.

5. Levator scapulae. From the transverse processes of the four uppermost vertebrae colli. Into the upper angle of the scapula. To move the scapulae forwards, and upwards.

6. Serratus superior posticus. From the lower part of the ligamentum colli, the spinous processes of the lowermost cervical vertebrae, and of the two superior dorsal vertebrae. Into the 4th ribs. To expand the thorax.

7. Splenius (f). From the spinous processes of the four or five uppermost vertebrae of the back, and of the lowermost cervical vertebra. Into the transverse processes of the two first cervical vertebrae, the upper and back part of the mastoid processes, and a ridge on the os occipitis. To move the head backwards.

8. Complexus (c). From the transverse processes of the four or five uppermost dorsal, and of the six lowermost cervical vertebrae. Into the os occipitis. To draw the head backwards.

9. Trachelo-mastoideus (n). From the transverse processes of the first dorsal vertebrae and four or five of the lowermost, cervical vertebrae. Into the mastoid processes. To draw the head backwards.

10. Rectus capitis posterior major. From the spinous processes of the second cervical vertebrae. Into the os occipitis. To extend the head and draw it backwards.

11. Rectus capitis posterior minor. From the first vertebra of the neck. Into the os occipitis. To assist the rectus major.

12. Obliquus superior capitis. From the transverse processes of the first cervical vertebrae. Into the os occipitis. To draw the head backwards.

13. Obliquus inferior capitis. From the spinous processes of the second cervical vertebrae. Into the transverse processes of the first cervical vertebrae. To draw the face towards the shoulder, and to move the first vertebra upon the second.

(v) According to some writers, this muscle has gotten its name from its resemblance to the spleen; others derive it from splenium splint.

(g) So named on account of its complicated structure.

(n) So named from its origin from the neck (ντροχαλος) and its insertion into the mastoid processes.
ANATOMY.

<table>
<thead>
<tr>
<th>Name</th>
<th>Origin</th>
<th>Insertion</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. Sacro-lumbalis</td>
<td>From the back part of the os sacrum, spinous processes and roots of the transverse processes of the vertebræ of the loins.</td>
<td>Into the lower edge of each rib.</td>
<td>To draw the ribs downwards, move the body upon its axis, assist in erecting the trunk, and turn the neck backwards, or to one side.</td>
</tr>
<tr>
<td>15. Longissimus dor-</td>
<td>The same as that of the sacro-lumbalis.</td>
<td>Into the transverse processes of the dor-sal vertebræ.</td>
<td>To stretch the vertebræ of the back, and keep the trunk erect.</td>
</tr>
<tr>
<td>fi (r)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Spinalis dor-</td>
<td>From the spinous processes of the uppermost lumbar and lowestmost dor-sal vertebræ.</td>
<td>Into the spinous processes of the nine superior dor-sal vertebræ.</td>
<td>To extend the vertebræ.</td>
</tr>
<tr>
<td>fi</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Semi-spinalis dor-</td>
<td>From the transverse processes of the 7th, 8th, 9th, and 10th vertebræ of the back.</td>
<td>Into the spinous processes of the four uppermost dor-sal, and lowestmost of the cervical vertebræ.</td>
<td>To extend the spine obliquely backwards.</td>
</tr>
<tr>
<td>fi</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Multifidus Spi-</td>
<td>From the os sacrum, ilium, oblique and transverse processes of the lumbar vertebræ, transverse processes of the dor-sal, and four of the cervical vertebræ.</td>
<td>Into the spinous processes of the lum-bar, dor-sal, and fix of the cervical vertebræ.</td>
<td>To extend the back and draw it backwards, or to one side.</td>
</tr>
<tr>
<td>nal (t)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. Semi-spinalis col-</td>
<td>From the transverse processes of the five or six uppermost dor-sal vertebræ.</td>
<td>Into the spinous processes of the 2d, 3d, 4th, 5th, and 6th cervical vertebræ.</td>
<td>To stretch the neck obliquely backwards.</td>
</tr>
<tr>
<td>li</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. Scaleni (m)</td>
<td>From the transverse processes of the five inferior cervical vertebræ.</td>
<td>Into the upper and outer part of the first and second ribs.</td>
<td>To move the neck forwards, or to one side.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) Several thin fasci of fleshly fibres arise from the lower ribs, and terminate in the inner side of this muscle. Steno names them musculi ad facro lumbalem accedentis. The sacro-lumbalis likewise sends off a fleshly fib from its upper part, which by Douglas and Albinus is described as a distinct muscle, under the name cervicis descendentis. Morgagni has very properly considered it as a part of the sacro-lumbalis.

At the upper part of this muscle a broad thin layer of fleshly fibres is found crossing, and intimately adhering to it. This portion, which is described by Albinus, under the name of transversalis cervicis, may very properly be considered as an appendage to the longissimus dor-si. It arises from the transverse processes of the five or six superior dor-sal vertebræ, and is inserted into the transverse processes of the six inferior cervical vertebræ. By means of this appendage the longissimus dor-si may serve to move the neck to one side, or obliquely backwards.

(2) Anatomists in general have unnecessarily multiplied the muscles of the spine. Albinus has the merit of having introduced greater simplicity into this part of myology. Under the name of multifidus spinæ, he has very properly included those portions of muscular flesh intermixed with tendinous fibres, situated close to the back part of the spine, and which are described by Douglas under the name of transversales colli, dor-si, & lumberum.

(m) The ancients gave it this name from its resemblance to an irregular triangle (transvers). It consists of three fleshly portions. The anterior one affords a passage to the axillary artery, and between this and the middle portion we find the nerves going to the upper extremities. The middle is in part covered by the posterior portion, which is the longest and thinnest of the three.
### ANATOMY

<table>
<thead>
<tr>
<th>Name</th>
<th>Origin</th>
<th>Insertion</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>21. Inter-spinallis(N)</td>
<td>From the upper part of each of the spinous processes of the inferior cervical vertebrae.</td>
<td>Into the under part of each of the spinous processes of the vertebrae above.</td>
<td>To draw the spinous processes towards each other.</td>
</tr>
<tr>
<td>22. Inter-transversales(o)</td>
<td>From the upper part of each of the transverse processes of the vertebrae.</td>
<td>Into the under part of each of the transverse processes of the vertebrae above.</td>
<td>To draw the transverse processes towards each other.</td>
</tr>
</tbody>
</table>

Muscles within the cavity of the abdomen, on the anterior and lateral parts of the spine.

1. Psoas parvus (p). From the sides and transverse processes of the uppermost lumbar vertebrae, and sometimes of the lowermost dorsal vertebrae. Into the brim of the pelvis, at the junction of the os pubis with the ilium. To bend the loins forwards.

2. Psoas magnus. From the bodies and transverse processes of the last dorsal, and all the lumbar vertebrae. Into the os femoris, a little below the trochanter minor. To bend the thigh forwards.

3. Iliacus internus. From the inner lip, hollow part, and edge of the os ilium. In common with the psoas magnus. To assist the psoas magnus.

4. Quadratus lumborum (q). From the posterior part of the spine of the ilium. Into the transverse processes of the four uppermost lumbar vertebrae, the inferior edge of the last rib, and the side of the lowermost dorsal vertebra. To support the spine, or to draw it to one side.

5. Coccygeus. From the posterior and inner edge of the spine of the ischium. Into the lower part of the os coccygis forwards and inwards (r). To draw the os coccygis laterally.

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(n) In the generality of anatomical books we find these muscles divided into inter-spinalis cervicis, dorfi, and lumborum, but we do not find any such muscles either in the loins or back.

(o) These muscles are to be found only in the neck and loins; what have been described, as the inter-transversales dorfi being rather small tendons than muscles.

(p) This and the following pair of muscles derive their name of psoas from psoas, lumbus, on account of their situation at the anterior part of the loins.

(q) So called from its shape, which is that of an irregular square.

(r) Some of the fibres of this muscle are united with those of the levator ani, so that it assists in closing the lower part of the pelvis.

(s) So named from its supposed resemblance to the Greek Δ reversed.
<table>
<thead>
<tr>
<th><strong>ANATOMY.</strong></th>
<th><strong>Name.</strong></th>
<th><strong>Origin.</strong></th>
<th><strong>Insertion.</strong></th>
<th><strong>Use.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>Biceps flexor cubiti</strong></td>
<td>From the coaroid process, and the other, or long head, from the upper and outer edge of the glenoid cavity of the scapula.</td>
<td>Into the lower part of the tuberosity.</td>
<td>To assist in bending the fore-arm.</td>
<td></td>
</tr>
<tr>
<td>2. <strong>Brachialis internus</strong></td>
<td>From the head below, and at each side of the tendon of the deltoide.</td>
<td>Into a small tuberosity.</td>
<td>To assist in bending the forearm.</td>
<td></td>
</tr>
<tr>
<td>3. <strong>Triceps extensor cubiti</strong></td>
<td>By three heads: the first, from the inferior cost of the scapula; the second, from the upper and outer part of the os humeri; and the third, from the back part of that bone.</td>
<td>Into the upper and outer part of the arm.</td>
<td>To extend the forearm.</td>
<td></td>
</tr>
</tbody>
</table>

**Muscles on the os humeri,** - - 1. **Biceps flexor cubiti.**

**Muscles on the forearm,** - - 1. **Supinator longus.**

2. **Extensor carpi radialis longus.**

3. **Extensor carpi radialis brevis.**

4. **Extensor digitorum communis.**

5. **Extensor.
ANATOMY.

5. **Extensor minimi**
   - **Name:** From the outer condyle of the os humeri.
   - **Origin:** To the little finger.
   - **Use:** To extend the little finger.

6. **Extensor carpi ulnaris**
   - **Name:** From the outer condyle of the os humeri.
   - **Origin:** To the metacarpal bone of the little finger.
   - **Use:** To extend the forearm.

7. **Anconeus (v)**
   - **Name:** From the outer condyle of the os humeri.
   - **Origin:** To the outer edge of the ulna.
   - **Use:** To extend the forearm.

8. **Flexor carpi ulnaris**
   - **Name:** From the inner condyle of the os humeri, and interior edge of the olecranon (w).
   - **Origin:** Into the os pisiforme.
   - **Use:** To extend the hand.

9. **Palmaris longus**
   - **Name:** From the inner condyle of the os humeri.
   - **Origin:** Into the internal annular ligament, and aponeurosis palmaris (x).
   - **Use:** To bend the hand.

10. **Flexor carpi radialis**
    - **Name:** From the inner condyle of the os humeri.
    - **Origin:** Into the metacarpal bone of the forefinger.
    - **Use:** To extend the hand.

11. **Pronator radii teres**
    - **Name:** From the outer condyle of the os humeri, and coronoid processes of the ulna.
    - **Origin:** Into the anterior and convex edge of the radius near its middle.
    - **Use:** To roll the hand inwards.

12. **Flexor sublimis perforatus (v)**
    - **Name:** From the inner condyle of the os humeri, inner edge of the coronoid processes of the ulna, and upper and anterior part of the radius.
    - **Origin:** Into the second bone of each finger.
    - **Use:** To bend the second joint of the fingers.

13. **Supinator radii brevis**
    - **Name:** From the outer condyle of the os humeri, and posterior surface and outer edge of the ulna.
    - **Origin:** Into the anterior, inner part of the radius, and upper part outwards.
    - **Use:** To roll the radius.

14. **Abductor pollicis longus**
    - **Name:** From the middle and back part of the ulna, interosseous ligament, and radius.
    - **Origin:** By two tendons into the os trapezium, and first bone of the thumb.
    - **Use:** To stretch the first bone of the thumb.

15. **Extensor minor pollicis**
    - **Name:** From the back part of the ulna, and interosseous ligament and radius.
    - **Origin:** Into the convex part of the second bone of the thumb.
    - **Use:** To extend the second bone of the thumb obliquely outwards.

16. **Extensor major pollicis**
    - **Name:** From the back of the ulna and interosseous ligament.
    - **Origin:** Into the third and last bone of the thumb.
    - **Use:** To stretch the thumb obliquely backwards.

17. **Indicator**
    - **Name:** From the middle of the ulna.
    - **Origin:** Into the metacarpal bone of the forefinger.
    - **Use:** To extend the forefinger.

18. **Flexor**

(v) So called from *aman*, cubitus.
(w) Between the two origins of this muscle we find the ulnar-nerve going to the forearm.
(x) The aponeurosis palmaris is a tendinous membrane that extends over the palm of the hand. Some anatomists have supposed it to be a production of the tendon of this muscle, but without sufficient grounds; for in some subjects we find the palmaris longus inserted wholly into the annular ligament, so as to be perfectly distinct from this aponeurosis; and it now and then happens, that no palmaris longus is to be found, whereas this expansion is never deficient.
(y) This muscle is named perforatus, on account of the four tendons in which it terminates, being perforated by those of another muscle, the perforans.
<table>
<thead>
<tr>
<th><strong>Name</strong></th>
<th><strong>Origin</strong></th>
<th><strong>Insertion</strong></th>
<th><strong>Use</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>13. Flexor profundus perforans.</td>
<td>From the upper and fore part of the ulna, and interosseous ligament.</td>
<td>Into the fore part of the last bone of each of the fingers.</td>
<td>To bend the last joint of each of the fingers.</td>
</tr>
<tr>
<td>19. Flexor longus pollicis.</td>
<td>From the upper and fore part of the radius.</td>
<td>Into the last joint of the thumb.</td>
<td>To bend the last joint of the thumb.</td>
</tr>
<tr>
<td>20. Pronator radii quadratus.</td>
<td>From the inner and lower part of the ulna.</td>
<td>Into the radius, opposite to its origin.</td>
<td>To roll the radius inwards, and of course to assist in the pronation of the hand.</td>
</tr>
</tbody>
</table>

**Muscles on the hand.**

1. **Lumbricales (z).** From the tendons of the perforans. Into the tendons of the extensor digitorum communis. To extend the two last joints of the fingers (a).

2. **Abductor brevis pollicis.** From the fore part of the internal annular ligament, os scaphoides, and one of the tendons of the abductor longus pollicis. Into the outer side of the 2d bone of the thumb, near its root. To move the thumb from the fingers.

3. **Opponens pollicis.** From the inner and anterior part of the internal annular ligament, and from the os scaphoides. Into the first bone of the thumb. Inwards, and to turn it upon its axis.

4. **Flexor brevis pollicis.** From the os trapezoides, internal annular ligament, os magnum, and os unciforme. Into the extensor seamen dea and second joint of the thumb. To bend the second bone of the thumb.

5. **Abductor pollicis.** From the metacarpal bone of the middle finger. Into the basis of the thumb. To move the thumb towards the fingers.

6. **Abductor indices.** From the inner side of the first bone of the thumb, and from the os trapezium. Into the first bone of the fore finger posteriorly. To move the fore finger towards the thumb.

7. **Palmaris brevis.** From the internal annular ligament, and aponeurosis palmaris. Into the os pisiforme, To contract the palm and the skin covering the abductor minimi digitii.

8. **Abductor minimi digitii.** From the internal annular ligament and os pisiforme. Into the side of the thumb. To draw the little finger from there. To bend the little finger.

9. **Flexor parvus minimi digitii.** From the os unciforme and internal annular ligament. Into the first bone of the little finger. To bend the little finger.

10. **Abductor metacarpal minimi digitii.** From the os unciforme and internal annular ligament. Into the metacarpal bone of the little finger. To move that bone towards the rest. To extend the fingers and move them towards the thumb (b).

11. **Intercostal interni.** Situated between the metacarpal bones. Into the roots of the fingers. To move the thumb (b).
ANATOMY

Part II.

Name. Origin. Insertion. Use.

12. Interosseus externi. Situated between the roots of the metacarpal bones on the back of the hand. To extend the fingers; but the first draws the middle finger inwards, the second draws it outwards, and the third draws the ring finger inwards.

MUSCLEs AT THE BACK PART OF THE PELVIS, AND UPPER PART OF THE THIGH.

1. Gluteus (c) maximus. From the spine of the ilium, posterior facet of the iliac crest. To extend the thigh and draw it outwards.

2. Gluteus medius. From the spine and superior surface of the ilium. Into the outer and back part of the great trochanter of the os femoris. To draw the thigh outwards and a little backwards, and when it is bent, to roll it.

3. Gluteus minimus. From the outer surface of the ilium and the border of its great niche. Into the upper and anterior part of the great trochanter. To lift the former.

4. Pyriformis (p). From the anterior part of the os sacrum. Into a cavity at the root of the trochanter major. To roll the thigh outwards.

5. Gemini (e). By two portions, one from the outer surface of the spine of the ilium; the other from the tuberosity of the ilium and posterior facet of the iliac crest ligament. Into the same cavity as the pyriformis. To roll the thigh outwards, and likewise to confine the tendon of the obturator internus, when the latter is in action.

6. Obturator internus. From the superior half of the inner border of the foramen thyroideum. Into the same cavity with the former. To roll the thigh outwards.

7. Quadratus (p) femoris. From the tuberosity of the ilium. Into a ridge between the trochanter major and trochanter minor. To move the thigh outwards.

ON THE THIGH

1. Biceps flexor crucis. By two heads; one from the tuberosity of the ilium, the other from the inner border of the os femoris. Into the upper and back part of the fibula (h). To bend the leg.

(c) From γλαντ, nates (p) So named from its pear-like shape.
(e) The two portions of this muscle having been described as two distinct muscles by some anatomists, have occasioned it to be named gemini. The tendon of the obturator internus runs between these two portions.
(p) This muscle is not of the square shape its name would seem to indicate.
(c) The muscles of the leg and thigh are covered by a broad tendinous membrane called fascia lata, that surrounds them in the manner of a sheath. It is fastened from the tendons of the glutei and other muscles, and dipping down between the muscles it covers, whereas to the linea aspera, and spreading over the joint of the knee, gradually disappears on the leg. It is thickest on the inside of the thigh.
(h) The tendon of this muscle forms the outer ham-string.
### ANATOMY

<table>
<thead>
<tr>
<th>Name</th>
<th>Origin</th>
<th>Insertion</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Rectus</td>
<td>From the anterior and inferior spinous processes of the ilium.</td>
<td>Into the upper and To extend the leg.</td>
<td>Fore-part of the patella.</td>
</tr>
<tr>
<td>2. Sartorius</td>
<td>From the superior and anterior spinous processes of the ilium.</td>
<td>Into the upper and To bend the leg.</td>
<td>Inner part of the tibia.</td>
</tr>
<tr>
<td>3. Semi-tendinosus</td>
<td>From the tuberosity of the ischium.</td>
<td>Into the upper and To bend and draw the inner part of the leg inwards.</td>
<td>Tibia.</td>
</tr>
<tr>
<td>4. Semi-membranosus (t)</td>
<td>From the tuberosity of the ischium.</td>
<td>Into the upper and To bend the leg.</td>
<td>Back part of the head of the tibia.</td>
</tr>
<tr>
<td>5. Tensor vaginæ femoris</td>
<td>From the superior and anterior spinous processes of the ilium.</td>
<td>Into the inner side of To stretch the fascia.</td>
<td>The fascia lata, which covers the outside of the thigh.</td>
</tr>
<tr>
<td>6. Sartorius</td>
<td>From the superior and anterior spinous processes of the ilium.</td>
<td>Into the upper and To bend the leg.</td>
<td>Inner part of the tibia.</td>
</tr>
<tr>
<td>7. Gracilis</td>
<td>From the fore-part of the ischium and pubis.</td>
<td>Into the upper and To bend the leg.</td>
<td>Inner part of the tibia.</td>
</tr>
<tr>
<td>8. Vastus externus (L)</td>
<td>From the anterior and lower part of the great trochanter, and the outer edge of the linea aspera.</td>
<td>To the upper and To extend the leg.</td>
<td>Outer part of the patella.</td>
</tr>
<tr>
<td>9. Vastus internus</td>
<td>From the inner edge of the linea aspera, beginning between the fore-part of the os femoris and the root of the lesser trochanter.</td>
<td>Into the upper and To extend the leg.</td>
<td>Inner part of the patella.</td>
</tr>
<tr>
<td>10. Crureus (M)</td>
<td>From the outer and anterior part of the lesser trochanter.</td>
<td>Into the upper part of To extend the leg.</td>
<td>The patella.</td>
</tr>
<tr>
<td>11. Pectinialis</td>
<td>From the anterior to the upper part of To extend the leg.</td>
<td>Into the upper and To draw the thigh edge of the os pubis, or pectinis, as it is sometimes called.</td>
<td>Inwards, upwards, and to roll it a little outwards.</td>
</tr>
<tr>
<td>12. Abducto</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Part II. Anatomy of the Muscles

<table>
<thead>
<tr>
<th>Name</th>
<th>Origin</th>
<th>Insertion</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. Abductor longus femoris (N)</td>
<td>From the upper and fore part of the os pubis</td>
<td>Near the middle and back part of the linea alba.</td>
<td>To draw the thigh inwards, upwards, and to roll it a little outwards.</td>
</tr>
<tr>
<td>13. Abductor brevis femoris</td>
<td>From the fore part of the ramus of the os pubis</td>
<td>Into the inner and upper part of the linea alba.</td>
<td></td>
</tr>
<tr>
<td>14. Abductor magnus femoris</td>
<td>From the lower and fore part of the ramus of the os pubis</td>
<td>Into the whole length of the linea alba.</td>
<td></td>
</tr>
<tr>
<td>15. Obturator externus</td>
<td>From part of the obturator ligament, and the inner half of the circumference of the foramen thyroideum.</td>
<td>Into the os femoris near the root of the great trochanter.</td>
<td>To move the thigh outwards in an oblique direction, and likewife to bend and draw it inwards.</td>
</tr>
</tbody>
</table>

**Muscles on the leg:**

<table>
<thead>
<tr>
<th>Name</th>
<th>Origin</th>
<th>Insertion</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gastrocnemius (o externus.</td>
<td>By two heads; one from the inner condyle, the other from the outer condyle of the os femoris.</td>
<td>By a great round tendon, common to this and the following muscle.</td>
<td>To extend the foot.</td>
</tr>
<tr>
<td>2. Gastrocnemius (p internus.</td>
<td>By two heads; one from the back part of the head of the fibula, the other from the upper and back part of the tibia.</td>
<td>By a large tendon (the tendon achillis) common to this and the former muscle, into the lower and back part of the os calcis.</td>
<td>To extend the foot.</td>
</tr>
<tr>
<td>3. Plantaris (q)</td>
<td>From the upper and posterior part of the outer condyle of the os femoris.</td>
<td>Into the inside of the back part of the os calcis.</td>
<td>To assist in extending the foot.</td>
</tr>
<tr>
<td>4. Popliteus (s)</td>
<td>From the outer condyle of the thigh.</td>
<td>Into the upper and to assist in bending the leg and rolling it inwards.</td>
<td></td>
</tr>
<tr>
<td>5. Flexor longus digitorum pedis (s)</td>
<td>From the upper and inner part of the tibia.</td>
<td>By four tendons, which, after passing through the perforations in those of the flexor digitorum brevis, are inserted into the last bone of all the toes except the great toe.</td>
<td>To bend the last joint of the toe.</td>
</tr>
<tr>
<td>6. Flexor longus pollicis pedis.</td>
<td>From the back part, and a little below the head of the fibula.</td>
<td>Into the last bone of To bend the great toe.</td>
<td></td>
</tr>
</tbody>
</table>

---

(n) This and the two following muscles have been usually, but improperly, considered as forming a single muscle with three heads, and on that account named triceps femoris.

(o) Γαστροκενημιον, 'sura, "the calf of the leg."

(p) This muscle is by some anatomists named solleus, on account of its being shaped like the sole-fish.

(q) This muscle has gotten the name of plantaris, from its being supposed to furnish the aponeurosis that covers the sole of the foot; but it does not in the least contribute to the formation of that tendinous expansion.

(r) So called on account of its situation at the ham (poples).

(s) This muscle, about the middle of the foot, unites with a fleshy mass, which, from its having first been described by Sylvius, is usually called mæna carnea JACOBI SYLVII.
### Anatomy

#### Muscles of the Foot

<table>
<thead>
<tr>
<th>Number</th>
<th>Muscle Name</th>
<th>Origin</th>
<th>Insertion</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Abductor pollicis</td>
<td>From the inner and lower part of the os calcis.</td>
<td>Into the first joint of the great toe.</td>
<td>To move the great toe from the other toes.</td>
</tr>
<tr>
<td>2.</td>
<td>Flexor brevis digitorum pedis</td>
<td>From the lower part of the os calcis.</td>
<td>By four tendons, one of which joins the tendon of the extensor longus pollicis, and the other three the tendons of the extensor digitorum longus.</td>
<td>To bend the second toe, after which, forming a passage to those of the flexor longus, are inserted into the second phalanx of each of the small toes.</td>
</tr>
<tr>
<td>3.</td>
<td>Adductor pollicis</td>
<td>From the inner and lower part of the os calcis.</td>
<td>Into the first joint of the great toe.</td>
<td>To move the great toe from the other toes.</td>
</tr>
<tr>
<td>4.</td>
<td>Abductor minimi digitii</td>
<td>From the outer tubercle of the os calcis, the root of the metatarsal bone of the little toe, and also from the aponeurosis plantaris.</td>
<td>Into the outer side of the first joint of the little toe.</td>
<td>To draw the little toe outwards.</td>
</tr>
<tr>
<td>5.</td>
<td>Lumbricales</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PLATE XXIII. AND XXIV.

EXPLANATION OF PLATES XXIII. AND XXIV.

Fig. 1. The muscles immediately under the common teguments on the anterior part of the body are represented on the right side; and on the left side the muscles are seen which come in view when the exterior ones are taken away.


Superior Extremity.—U, Deltaoid. V, Pectoralis major. W, Part of the latissimus dorsi. X, X, Biceps flexor cubiti. Y, Y, Part of the brachialis externus. Z, Z, The beginning of the tendinous aponeurosis (from the biceps), which is spread over the muscles of the fore-arm. a, Its strong tendon inserted into the tubercle of the radius. b, Part of the brachialis internus. c, Pronator radii teres. d, Flexor carpi radialis. e, Part of the flexor carpi ulnaris. f, Palmaris longus. g, Aponeurosis palmaris. h, Palmaris brevis. i, Ligamentum carpi annulare. 22, Abductor minimi digiti. h, Supinator radii longus.

1. The tendons of the thumb. k, Adductor pollicis. l, Flexor pollicis longus. m, The tendons of the flexor sublimis perforatus, profunus perforans, and lumbricales. The sheaths are entire in the right hand.—in the left cut open to show the tendons of the flexor profundus perforating the sublimis.

Muscles not referred to—in the left superior extremity.—a, Pectoralis minor, tendon profundus and sublimis. o, The two heads of (x x) the biceps. p, Coraco-brachialis. q q, The long head of the triceps extensor cubiti. r r, Teres major. s, Subcapularis. t, T, Extensor radiales. u, Spinatar brevis. v, The cut extremity of the pronator teres. w, Flexor sublimis perforatus. x, Part of the flexor profundus. y, Flexor pollicis longus. z, Part of the flexor pollicis brevis. 4, Adductor minimi digitii. 5. The four lumbricales.

Trunk.—6, Serrate extremities of the serratus anterior major. 7, 7, Obliquus externus abdominis. 8, 8, The linea alba. 9, The umbilicus. 10, Pyramidalis. 11, 11, The spermatic cord. On the left side it is covered by the cremaster. 12, 12, Rectus abdominis. 13, Obliquus internus. 14, 14, External oblique muscles.

Inferior Extremities.—a a, The gracilis. b b, Parts of the triceps. c c, Pectineus. d d, Plosus magnus. e e, Biceps internus. f, Part of the gluteus medius. g, Part of the gluteus minimus. h, Cut extremity of the rectus cruris. i i, Vastus externus. k, Tendon of the rectus cruris. l l, Vastus internus.

Z Z. 2. Sartorius

(1) The interossei interni are three in number; their use is to draw the smaller toes towards the great toe.
(2) The interossei externi are four in number; the first serves to move the fore-toe towards the great toe; the rest move the toes outwards. All the interossei assist in extending the toes.
ANATOMY.

Of the Muscles.

* Sartorius muscle. ** Flethy origin of the tenor vaginae femoris or membranous. Its tendinous aponeurosis covers (i) the vastus externus on the right side.

m m, Patella. n n, Ligament or tendon from it to the tibia. o, Rectus cruris. p, Cruratus. q g, The tibia. r r, Part of the Gemellus or gastrocnemius externus. s s, Part of the soleus or gastrocnemius internus. t, Tibialis anterior. u, Tibialis posterior. v v, Peroneus muscles. w w, Extensor longus digitorum pedis. x x, Extenfor longus pollis pedis. y, Abducitor pollis pedis.

Fig. 2. The Muscles, Glands, &c. of the Left Side of the face and neck, after the common Teguments and Platyma myoides have been taken off. a, The frontal muscles. b, Temporalis and temporal artery. c, Orbicularis palpebrarum. d, Levator labii superioris alaeque nasi. e, Levator anguli oris. f, Zygomaticus. g, Depressor labii inferioris. h, Depressor anguli oris. i, Buccinator. k, Masseter. l, Parotid gland. m, Its duct. n, Sterno-cleidomastoideus. o, Part of the trapezius. p, Sternohyoides. q, Sterno-hyoideus. r, Omo-hyoides. s, Levator scapulae. t t, Scaleni. u, Part of the pleuris.

Fig. 3. The Muscles of the Face and Neck in view after the exterior ones are taken away. a a, Corrugator supercilii. b, Temporalis. c, Tendon of the levator palpebrarum superioris. d, Tendon of the orbicularis palpebrarum. e, Masseter. f, Buccinator. g, Levator anguli oris. h, Depressor labii inferioris alaeque nasi. i, Orbicularis oris. k, Depressor anguli oris. l, Muscles of the os hyoides. m, Sterno-cleido-mastoideus.

Fig. 4. Some of the Muscles of the Os Hyoides and Submaxillary Gland.

a, Part of the masseter muscle. b, Posterior head of the digastric. c, Its anterior head. d, Sternohyoides. e, Omo-hyoides. f, Stylo-hyoides. g, Submaxillary gland in situ.

Fig. 5. The Submaxillary Gland and Duèt.

a, Musculus mylo-hyoides. b, Hyo-glossus. c, Submaxillary gland extra situ. d, Its duct.

PLATE XXIV.

Fig. 1. The Muscles immediately under the common teguments on the posterior part of the body are represented in the right side; and on the left side the Muscles are seen which come in view when the exterior ones are taken away.


Superior Extremity.—Left side. a, Supra-spinatus. b, Infra-spinatus. c, Teres minor. d, Teres major. e, Triceps extensor cubiti. f f, Extensor carpi radiales. g, Supinator brevis. h, Indicater. 1 2 3, Extensors pollicis. i, Abducitor minimi digit. k, Interosseus.

Inferior Extremity.—Right side. L, Gluteus maximus. m, Part of the Gluteus medius. n, Tensor vaginalis femoris. o, Gracilis. p p, Abducitor femoris magnus. q, Part of the vastus internus. r, Semimembranosus. s, Semitendinosus. t, Long head of the biceps flexor cruris. u u, Gastrocnemius externus fem. v, Tendo Achillis. w, Soleus. x x, Peroneus longus and brevis. y y, Tendons of the flexor longus digitorum pedis; and under them * flexor brevis digitorum pedis. z, Abducitor minimi digit. p p, Interosseus.

Inferior Extremity.—Left side. m m, n n, p p, q q, r r, s s, t t, u u, v v, w w, x x, y y, z z. Point the same parts as in the right side. a, Pyriformis. b b, Gemini. c c, Obturator internus. d, Quadratus femoris. e e, Coccygeus. f f, The short head of the biceps flexor cruris. g g, Plantaris. h h, Popliteus. i, Flexor longus pollicis pedis.

Fig. 2. The Palm of the Left Hand after the common Teguments are removed to show the Muscles of the Fingers.

a, Tendon of the flexor carpi radialis. b, Tendon of the flexor carpi ulnaris. c, Tendons of the flexor sublimis perforatus, profundus perforans and lumbricales. d, Abducitor pollicis. e e, Flexor pollicis longus. f f, Flexor pollicis brevis. g g, Palmaris brevis. h, Abducitor minimi digit. i, Ligamentum carpi radialis. k, A probe put under the tendons of the flexor digitorum sublimis; which are performed by 1, the flexor digitorum profundus. m m m, Lumbricales. n, Abducitor pollicis.

Fig. 3. A fore-view of the foot and Tendons of the Flexores Digitorum.

a, Cut extremity of the tendo Achillis. b, Upper part of the astragal. c, Os calcis. d, Tendon of the tibialis anterior. e e, Tendon of the extensor pollicis longus. f, Tendon of the peroneus brevis. g g, Tendons of the flexor digitorum longus, with the naves Vefali. h h, The whole of the flexor digitorum brevis.

Fig. 4. Muscles of the Anus.

a a, An out line of the buttocks, and upper part of the thighs. b, The tefles contained in the frenum. c c, Sphincter ani. d, Anus. e e, Levator ani. f f, Erector penis. g g, Accelerator urinæ. h h, Corpus cavernosum urethæ.

Fig. 5. Muscles of the Penis.

a a, b b, c c, d d, e e, f f, h h, point the same as in fig. 4. c c, Sphincter ani. g g, Transverfallis penis.

PART II.
THE abdomen, or lower belly, extends from the lower extremity of the sternum, or the hollow, usually called the pit of the stomach, and more properly the hypochondriac region, to the lower part of the trunk.

Its distinguished into three divisions called regions; of these the upper one, which is called the epigastric region, begins immediately under the sternum, and extends to within two fingers breadth of the navel, where the middle or umbilical region begins, and reaches to the same distance below the navel. The third, which is called the hypogastric, includes the rest of the abdomen, as far as the os pubis.

Each of these regions is subdivided into three others; two of which compose the sides, and the other the middle part of each region.

The middle part of the upper region is called epigastric, and its two sides hypochondriac. The middle part of the next region is the umbilical region, properly so called, and its two sides are the flanks, or iliac regions. Lastly, the middle part of the lower region retains the name of hypogastric, and its sides are called inguinal or groin. The back part of the abdomen bears the name of lumbar region.

These are the divisions of the lower belly, which are necessary to be held in remembrance, as they frequently occur in surgical and anatomical writing. We will now proceed to examine the contents of the abdomen; and after having pointed out the names and arrangement of the several visceræ contained in it, describe each of them separately.

After having removed the skin, adipose membrane, and abdominal muscles, we discover the peritoneum or membrane that envelopes all the visceræ of the lower belly. This being opened, the first part that presents itself is the omentum or cawl, floating on the surface of the intestines, which are likewise seen everywhere loose and moist, and making a great number of circumvolutions through the whole cavity of the abdomen. The stomach is placed in the epigastric region, and under the stomach is the pancreas. The liver fills the right hypochondriac region, and the spleen is situated in the left. Their kidneys are seen between the middle of the lumbar region, and the urinary bladder and parts of generation are seated in the lower division of the belly.

Sect. I. Of the Peritoneum.

The peritoneum is a strong simple membrane, by which all the visceræ of the abdomen are surrounded, and in some measure supported. Many anatomical writers, particularly Winlow, have described it as being composed of two distinct membranous laminae; but their description seems to be erroneous. What perhaps appeared to be a second lamina, being found to be simply a cellular coat, which sends off productions to the blood-vessels passing out of the abdominal cavity. The aorta and vena cava likewise derive a covering from the same membrane, which seems to be a part of the cellular membrane we have already described.

The peritoneum, by its productions and reduplications, envelopes the greatest part of the abdominal visceræ. It is soft, and capable of considerable extension; and is kept smooth and moist by a vapour, which is constantly exhaling from its inner surface, and is returned again into the circulation by the absorbents.

This moisture not only contributes to the softness of the peritoneum, but prevents the attrition, and other ill effects which would otherwise probably be occasioned, by the motion of the visceræ upon each other.

When this fluid is supplied in too great a quantity, or the absorbents become incapable of carrying it off, it accumulates, and constitutes an ascites or drophi of the belly; and when by any means the exhalation is discontinued, the peritoneum thickens, becomes disfigured, and the visceræ are sometimes found adhering to each other.

The peritoneum is not a very vascular membrane. In a sound state it seems to be endowed with little or no feeling, and the nerves that pass through it appear to belong to the abdominal muscles.

Sect. II. Of the Omentum

The omentum, epiploon, or cawl, is a double membrane, produced from the peritoneum. It is interlarded with fat, and adheres to the stomach, spleen, duodenum, and colon; from whence hanging down loose and floating on the surface of the intestines. Its size is different in different subjects. In some it descends as low as the pelvis, and it is commonly longer at the left side than the right.

This part, the situation of which we have just now described, was the only one known to the ancients under the name of epiploon; but at present we distinguish three omenta, viz. omentum magnum colico gastricum, omentum parvum hepatico gastricum, and omentum colicium. They all agree in being formed of two very delicate laminae, separated by a thin layer of cellular membrane.

The omentum magnum colico gastricum, of which we have already spoken, derives its arteries from the splenic and hepatic. Its veins terminate in the vena portæ. Its nerves, which are very few, come from the splenic and hepatic plexus.

The omentum parvum hepatico gastricum, abounds less with fat than the great epiploon. It begins at the upper part of the duodenum, extends along the lesser curvature of the stomach as far as the cæophagus, and terminates about the neck of the gall-bladder, and behind the left ligament of the liver, so that it covers the lesser lobe: near the beginning of which we may observe a small opening, first described by Winlow, through which the whole pouch may easily be distend-
ANATOMY.

Of the Stomach.

The stomach is a membranous and muscular bag, in shape not unlike a bagpipe, lying across the upper part of the abdomen, and inclining rather more to the left than the right side.

It has two orifices, one of which receives the end of the oesophagus, and is called the cardia, and sometimes the left and upper orifice of the stomach; though its situation is not much higher than the other, which is styled the right and inferior orifice, and more commonly the pylorus; both these openings are more elevated than the body of the stomach.

The aliment passes down the oesophagus into the stomach through the cardia, and after having undergone the necessary digestion, passes out at the pylorus where the intestinal canal commences.

The stomach is composed of four tunics or coats, which are so intimately connected together that it requires no little dexterity in the anatomist to demonstrate them. The exterior one is membranous, being derived from the peritoneum. The second is a muscular tunic, composed of fibrous fibres which are in the greatest number about the two orifices. The third is called the nervous coat, and within this is the villous or velvet-like coat which composes the inside of the stomach.

The two last coats being more extensive than the two first, form the folds, which are observed every where in the cavity of this viscus, and more particularly about the pylorus; where they seem to impede the too hasty exclusion of the aliment, making a considerable plait, called voluta pylori.

The inner coat is constantly moistened by a mucus, which approaches to the nature of the saliva, and is called the gastric juice; this liquor has been supposed to be secreted by certain minute glands (v) seated in the nervous tunic, whose excretory ducts open on the surface of the villous coat.

(x) This membranous bag, though exceedingly thin and transparent, is found capable of supporting mercury, thrown into it by the same channel.

(v) Heister, speaking of these glands, very properly says, "in peris facile, in homine raro obseruarius;" for although many anatomical writers have described their appearance and figure, yet they do not seem to have been hitherto satisfactorily demonstrated in the human stomach; and the gastric juice is now more generally believed to be derived from the exhalant arteries of the stomach.

THE arteries of the stomach called the gastric arteries are principally derived from the coeliac; some of its veins pass to the splenic, and others to the vena portae; and its nerves are chiefly from the eighth pair or par vagum.

The account given of the tunics of the stomach may be applied to the whole alimentary canal; for both the oesophagus and intestines are, like this viscus, composed of four coats.

Before we describe the course of the aliment and the uses of the stomach, it will be necessary to speak of other parts which assist in the process of digestion.

Sect. IV. Of the Oesophagus.

The oesophagus or gullet is a membranous and muscular canal, extending from the bottom of the mouth to the upper orifice of the stomach. Its upper part where the aliment is received is shaped somewhat like a funnel, and is called the pharynx.

From hence it runs down close to the bodies of the vertebrae as far as the diaphragm, in which there is an opening through which it passes, and then terminates in the stomach about the eleventh or twelfth vertebra of the back.

The oesophagus is plentifully supplied with arteries from the external carotid, bronchial, and superior intercostal arteries; its veins empty themselves into the vena azygos, internal jugular, and mammary veins, &c.

Its nerves are derived chiefly from the eighth pair. We likewise meet with a mucus in the oesophagus, which every where lubricates its inner surface, and tends to assist in deglutition.—This mucus seems to be secreted by very minute glands, like the mucus in other parts of the alimentary canal.

Sect. V. Of the Intestines.

The intestines form a canal, which is usually five times longer than the body to which it belongs. This canal extends from the pylorus, or inferior orifice of the stomach, to the anus.

It will be easily understood, that a part of such great length must necessarily make many circumvolutions, to be confined to so many other visceras within the cavity of the lower belly.

Although the intestines are in fact, as we have observed, only one long and extensive canal, yet different parts have been distinguished by different names. The intestines are first distinguished into two parts, one of which begins at the stomach, and is called the thin, or small intestines, from the small size of the canal when compared with the other part, which is called the large intestines, and includes the lower portion of the canal down to the anus.

Each of these parts has its subdivisions.—The small
Part III.

ANATOMY.

Of the intestines being distinguished into duodenum, jejunum, and ileum, and the larger portion into cecum, colon, and rectum.

The small intestines fill the middle and fore parts of the belly, while the large intestines fill the sides and both the upper and lower parts of the cavity.

The duodenum, which is the first of the small intestines, is so called, because it is about 12 inches long. It begins at the pylorus and terminates in the jejunum, which is a part of the canal observed to be usually more empty than the other intestines. This appearance gives it its name, and likewise serves to point out where it begins.

The next division is the ileum, which of itself exceeds the united length of the duodenum and jejunum, and has received its name from its numerous circumvolutions. The large circumvolution of the ileum covers the first of the large intestines called the cecum (x), which seems properly to belong to the colon, being a kind of pouch of about four fingers in width, and nearly of the same length, having exteriorly a little appendix, called appendix ceci.

The cecum is placed in the cavity of the os ileum on the right side, and terminates in the colon, which is the largest of all the intestines.

This intestine ascends by the right kidney to which it is attached, pausing under the hollow part of the liver, and the bottom of the stomach, to the spleen, to which it is likewise secured, as it is also to the left kidney; and from thence passes down towards the os sacrum, where, from its straight course, the canal begins to take the name of rectum.

There are three ligamentous bands extending thro' the whole length of the colon, which, by being shorter than its two inner coats, serve to increase the plaits on the inner surface of this gut.

The anus which terminates the intestine rectum, is furnished with three muscles; one of these is composed of circular fibres, and from its use in shutting the passage of the anus is called sphincter ani.

The other two are the levatores ani, so called, because they elevate the anus after defecation. When these by palsy, or any other disease, lose the power of contracting, the anus prolapses; and when the sphincter is affected by similar causes, the faeces are voided involuntarily.

It has been already observed, that the intestinal canal is composed of four tantes; but it remains to be remarked, that here, as in the stomach, the two inner tunics being more extensive than the other two, from the plaits which are to be seen in the inner surface of the intestines, and are called valvula conniventes.

Some authors have considered these plaits as tending to retard the motion of the faeces, in order to afford more time for the separation of the chyle; but there are others who attribute to them a different use: they contend, that these valves, by being naturally inclined downwards, cannot impede the descent of the faeces, but that they are intended to prevent their return upwards.

They are probably destined for both these uses; for although these folds incline to their lower side, yet the inequalities they occasion in the canal are sufficient to retard, in some measure, the progressive motion of the faeces, and to afford a greater surface for the absorption of chyle, and their natural position seems to oppose itself to the return of the aliment.

Besides these valvula conniventes, there is one more considerable than the rest, called the valve of the colon; which is found at that part of the canal where the intestine ileum is joined to the colon. This valve permits the alimentary pulp to pass downwards, but serves to prevent its return upwards; and it is by this valve, that gylsters are prevented from passing into the small intestines (y).

Of the little vermiform appendix of the cecum, it will be sufficient to say, that its uses have never yet been ascertained. In birds we meet with two of these appendices.

The intestines are lubricated by a constant supply of mucus, which is probably secreted by very minute follicles (z). This mucus promotes the descent of the alimentary pulp, and in some measure defends the inner surface of the intestines from the irritation to which it would, perhaps, otherwise be continually exposed from the aliment; and which, when in a certain degree, excites a painful disorder called colic, a name given to the disease, because its most usual seat is in the intestines colon.

The intestines are likewise frequently distended with air, and this dilatation sometimes occasions pain, and constitutes the flatulent colic.

The arteries of the intestines are continuations of the mesenteric arteries, which are derived in two considerable branches from the aorta.--The redundant blood is carried back into the vein porus.

In the rectum the veins are called hemorrhoidal, and are there distinguished into internal and external; the first are branches of the inferior mesenteric vein, but the latter pass into other veins. Sometimes these veins are distended with blood from ulcra, from weakness of their coats, or from other causes, and what we call the hemorrhoids takes place. In this disease they are sometimes ruptured; and the discharge of blood which

(x) Anatomists have differed with respect to this division of the intestines. The method here followed is now generally adopted; but there are authors who allow the name of cecum only to the little appendices, which has likewise been called the vermiform appendix, from its resemblance to a worm in size and length.

(y) This is not invariably the case, for the contents of a gylster have been found not only to reach the small intestines, but to be voided at the mouth. Such instances, however, are not common.

(z) Some writers have distinguished these glands into miliary, lenticular, &c.--Brunner and Peyer were the first anatomists who described the glands of the intestines, and their descriptions were chiefly taken from animals, these glandular appearances not seeming to have been hitherto satisfactorily pointed out in the human subject. It is now pretty generally believed, that the mucus which everywhere lubricates the alimentary canal, is exhaled from the minute ends of arteries; and that these extremities first open into a hollow vehicle, from whence the deposited juice of several branches flows out through one common orifice.
which consequently follows, has probably occasioned them to be called hemorrhoidal veins.

The nerves of the intestines are derived from the eighth pair.

Sect. VI. Of the Mesentery.

The name of the mesentery implies its situation amidst the intestines. It is in fact a part of the peritonæum, being a reduplication (A) of that membrane from each side of the lumbar vertebra, to which it is firmly attached, so that it is formed of two laminae, connected to each other by cellular membrane.

The intestines, in their different involutions, form a great number of arches, and the mesentery accompanies them through all these turns; but by being attached only to the hollow part of each arch, it is found to have only a third of the extent of the intestines.

That part of this membrane which accompanies the small intestines is the mesentery, properly so called; but those parts of it which are attached to the colon and rectum are distinguished by the names of meso-colon and meso-rectum.

There are many conglomerate glands diffused thro' this double membrane, through which the lacteals and lymphatics pass in their way to the thoracic veins. The blood-vessels of the mesentery were described in speaking of the intestines.

This membrane, by its attachment to the vertebrae, serves to keep the intestines in their natural situation. The idea usually formed of the colic called mifserere, is perfectly erroneous; it being impossible that the intestines can be twisted, as many suppose they are, in that disease, their attachment to the mesentery effectually preventing such an accident—but a disarrangement sometimes takes place in the intestinal canal itself, which is productive of disagreeable and sometimes fatal consequences.—This is by an introversion of the intestine, an idea of which may be easily formed, by taking the finger of a glove, and involving one part of it within the other.

If inflammation takes place, the fistula in this case is inverted, and the peristaltic motion of the intestines (by which is meant the progressive motion of the faces downwards) is inverted, and what is called the lisse paffon takes place. The same effects may be occasioned by a deficient of the intestine, or of the omentum either with it or by itself, and thus constituting what is called an hernia or rupture; a term by which in general is meant the falling down or protrusion of any part of the intestine or omentum, which ought naturally to be contained within the cavity of the belly.

(A) He who only reads of the reduplication of membranes, will perhaps not easily understand how the peritonæum and pleura are reflected over the viscera in their several cavities; for one of these serves the same purposes in the thorax that the other does in the abdomen. This disposition, for the discovery of which we are indebted to modern anatomists, constitutes a curious part of anatomical knowledge; but the student, unaided by experience, and assisted only by what the limits of this work would permit us to say on the occasion, would probably imitate only confused ideas of the matter; and it will perfectly answer the present purpose, if he considers the mesentery as a membrane attached by one of its sides to the lumbar vertebrae, and by the other to the intestines.

(a) The hernia congenita will be considered with the male organs of generation, with which it is intimately connected.
Part III.

ANATOMY.

Of the Abdomen.

The liver is a viscus of considerable size, and of a reddish colour; convex superiorly and anteriorly where it is placed under the ribs and diaphragm, and of an unequal surface posteriorly. It is chiefly situated in the right hypochondrium, and under the false ribs; but it likewise extends into the epigastric region, where it borders upon the stomach. It is covered by a production of the peritoneum, which serves to attach it by three of its reduplications to the false ribs. These reduplications are called ligaments, though very different in their texture from what are called by the same name in other parts of the body. The umbilical cord, too, which in the foetus is previous, gradually becomes a simple ligament after birth; and, by passing to the liver, serves likewise to secure it in its situation.

At the posterior part of the organ where the umbilical vessels enter, it is found divided into two lobes. Of these, the largest is placed in the right hypochondrium; the other, which covers part of the stomach, is called the little lobe. All the vessels which go to the liver pass at the fissure we have mentioned; and the production of the peritoneum, which invests the liver, was described by Glisson, an English anatomist, as accompanying them in their passage, and surrounding them like a glove; hence this production has been commonly known by the name of capsula of Glisson: but it appears to be chiefly a continuation of the cellular membrane which covers the vena portae interna. The liver was considered by the ancients as an organ destined to prepare and perfect the blood; but later discoveries have proved, that this opinion was wrong, and that the liver is a glandular substance formed for the secretion of the bile.

The blood is conveyed to the liver by the hepatic artery and the vena portae. This is contrary to the mode of circulation in other parts, where veins only serve to carry off the redundant blood: but in this viscus the hepatic artery, which is derived from the celiac, is principally destined for its nourishment; and the vena portae, which is formed by the union of the veins from most of the abdominal viscera, furnishes the blood from which the bile is chiefly to be separated; so that these two series of vessels serve very distinct purposes. The vena portae, as it is ramified through the liver, performs the office both of a vein and an artery; for like the former it returns the blood from the extremities of arteries, while as the latter it prepares it for secretion.

The nerves of the liver are branches of the intercostal and par vagum. The bile, after being separated from the mass of blood, in a manner of which mention will be made in another place, is conveyed out of this organ by very minute excretory ducts, called porti-biliarii; these uniting together like the excretory ducts in the pancreas, gradually form larger ones, which at length terminate in a considerale canal called ductus hepaticus.

Sect. VIII. Of the Liver.

The gall-bladder is a little membranous bag, shaped like a pear, and attached to the posterior and alaless inferior part of the great lobe of the liver. It has two unions, of which the exterior one is a production of the peritoneum. The interior, or villous coat, is supplied with a mucous layer that defends it from the acidity of the bile. These two coverings are intimately connected by means of cellular membrane, which from its firm glistening appearance has generally been spoken of as a mucular tunic.

The gall-bladder is supplied with blood-vessels from the hepatic arteries. These branches are called the cystic arteries, and the cystic veins carry back the blood.

Its nerves are derived from the same origin as those of the liver.

The neck of the gall-bladder is continued in the form of a canal called ductus cysticus, which soon unites with the ductus hepaticus we described as the excretory duct of the liver; and forming one common canal, takes the name of ductus coledochus communis, through which both the cystic and hepatic bile are discharged into the duodenum. This canal opens into the intestine in an oblique direction, first passing through the exterior tunic, and then piercing the other coats after running between each of them a very little way. This economy serves two useful purposes; — to promote the discharge of bile and to prevent its return.

The bile may be defined to be a natural liquid soap, somewhat tenacious and bitter, and of a yellowish colour, which easily mixes with water, oil, and vineous spirits, and is capable of dissolving resinos substances. From some late experiments made by M. Cadet, it appears to be formed of an animal oil, combined with an alkaline base of sea-salt, a salt of the nature of bones, milk, and a calcareous earth which is chiefly ferruginous.

Its definition seems sufficiently to point out the usages for which it is intended (c). It blends the alimentary masts, by dividing and attenuating it; corrects the too great disposition to acidency, which the aliment acquires in the stomach; and, finally, by its acidity, tends to excite the peristaltic motion of the intestines.

After what has been said, it will be conceived that there are four parts of bile; one of which is derived immediately from the liver through the hepatic duct, and the other from the gall-bladder. These twobreeds, however, do not essentially differ from each other. The hepatic bile indeed is milder, and more liquid than the cystic, which is constantly thicker and yellower; and

(c) The ancients, who were not acquainted with the real use of the liver, considered the bile as an excrementitious and useless fluid.
and by being bitterer, seems to possess greater activity than the other.

Every body knows the source of the hepatic bile, that it is secreted from the masts of blood by the liver; but the origin of the cystic bile has occasioned no little controvert amongst anatomical writers. There are some who contend, that it is separated in the substance of the liver, from whence it passes into the gall-bladder through particular vesicles. In deer, and in some other quadrupeds, as well as in several birds and fishes, there is an evident communication, by means of particular vesicles, between the liver and the gall-bladder. Bianchi, Winslow, and others, have asserted the existence of such vesicles in the human subject, and named them hepaticc vesicles; but it is certain that no such ducts exist.

In obstructions of the cystic duct, the gall-bladder has been found thrivelled and empty; so that we may consider the gall-bladder as a reservoir of hepatic bile; and that it is an established fact, that the whole of the bile contained in the gall-bladder is derived from the liver; that it passes from the hepatic to the cystic duct, and from that to the gall-bladder.

The difference in the colour, consistence, and taste of the bile, is merely the consequence of stagnation and absorption. When the stomach is distended with aliment, this reservoir undergoes a certain degree of compression, and the bile passes out into the intestinal canal, and in the efforts to vomit, the gall-bladder charges itself of its contents, and at such times discharges itself of its contents.

Sometimes the bile concretes in the gall-bladder, so as to form what are called gall stones (v). When these concretions pass into the cystic duct, they sometimes occasion exquisite pain, by distending the canals in their way to the duodenum; and by lodging in the ductus choledochus communis, and obstructing the course of the bile, this fluid will be absorbed, and by being carried back into the circulation occasion a temporary jaundice.

Sect. X. Of the Spleen.

The spleen is a soft and spongy viscus, of a bluish colour, and about five or six fingers breadth in length, and three in width, situated in the left hypochondrium, between the stomach and the falciform ria. That side of it which is placed on the side of the ribs is convex; and the other, which is turned toward the stomach, is concave.

The splenic artery, which is a branch from the coeliac, supplies this viscus with blood, and a vein of the same name carries it back into the vena porta.

Its nerves are derived from a particular plexus called the pleura, which is formed by branches of the intercostal nerve, and by the eighth pair, or par vagum.

The ancients, who supposed two sorts of bile, considered the spleen as the receptacle of what they called atra bilis. Havers, who wrote professedly on the bones, determined its use to be that of secreting the synovia; and the late Mr Hewson imagined, that it concurred with the thymus and lymphatic glands of the body in forming the red globules of the blood. All these opinions seem to be equally fanciful. The want of an excretory duct has occasioned the real use of this viscus to be still doubtful. Perhaps the blood undergoes some change in it, which may assist in the preparation of the bile. This is the opinion of the generality of modern physiologists; and the great quantity of blood with which it is supplied, together with the course of its veins into the vena portae, seem to render this notion probable.

Sect. XI. Of the Glandula Renalis, Kidneys, and Ureters.

The glandula renalis, which were by the ancients supposed to secrete the atra bilis, and by them named cæsula atrabilis, are two flat bodies of an irregular figure, one on each side of the abdomen and the aorta.

In the fetus they are as large as the kidneys; but they do not increase afterwards in proportion to those parts, and in adults and old people they are generally found thrivelled, and much wasted. They have their arteries and veins. Their arteries usually arise from the splenic or the celiac, and terminate in the aorta; and their veins go to the neighbouring veins, or to the vena cava. Their nerves are branches of the intercostal.

The use of these parts is not yet perfectly known. In the fetus the secretion of urine must be in a very small quantity, and a part of the blood may perhaps then pass through these channels, which in the adult is carried to the kidneys to supply the matter of urine.

The kidneys are two in number, situated one on the right and the other on the left side in the lumbar region, between the last false rib and the os illium, by the sides of the vertebrae. Each kidney in its figure resembles a fort of bean, which from its shape is called kidney bean. The concave part of each kidney is turned towards the aorta and vena cava ascendens. They are surrounded by a good deal of fat, and receive a coat from the peritoneum; and when this is removed, a very fine membrane is found investing their substance and the vesicles which ramify through them.

Each kidney has a considerable artery and vein, which are called the renal. The artery is a branch from the aorta, and the vein passes into the vena cava. Their nerves, which every where accompany the blood-veins, arise from a considerable plexus, which is derived from the intercostal.

In each kidney, which in the adult is of a pretty firm texture, there are three substances to be distinguished (e). The outer part is glandular or cortical, beyond

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(o) These concretions sometimes remain in the gall-bladder without causing any uneasiness. Dr Heberden relates, that a gall-stone weighing two drams was found in the gall-bladder of the late Lord Bath, though he had never complained of the jaundice, nor of any disorder which he could attribute to that cause. Med. Trans. Vol. ii.

(e) The kidneys in the fetus are distinctly lobulated; but in the adult they become perfectly firm, smooth, and regular.
beyond this is the vascular or tubular substance, and the inner part is papillary or membranous.

It is in the cortical part of the kidney that the secretion is carried on; the urine being here received from the minute extremities of the capillary arteries, is conveyed out of this cortical substance by an infinite number of very small cylindrical canals or excretory vessels, which constitute the tubular part. These tubes, as they approach the inner substance of the kidneys, gradually unite together; and thus forming larger canals, at length terminate in ten or twelve little protuberances called papillæ, the orifices of which may be seen without the assistance of glasses. These papillæ open into a small cavity or pelvis of the kidney, and formed by a distinct membranous bag which embraces the papillæ. From this pelvis the urine is conveyed through a membranous canal which issues out from the hollow side of the kidney, a little below the blood vessels, and is called ureter.

The ureters are each about as large as a common writing-pen. They are somewhat curved in their course from the kidneys, like the letter J, and at length terminate in the posterior and almost inferior part of the bladder, at some distance from each other. They pass into the bladder in the same manner as the ductus choledochus communis passes into the intestine duodenum, not by a direct passage, but by an oblique course between the two coats; so that the discharge of urine into the bladder is promoted, whilst its return is prevented. Nor does this mode of structure prevent the passage of fluids only from the bladder into the ureters, but likewise air:—for air thrown into the bladder inflates it, and it continues to be distended in a certain degree, whilst the evacuation depends on the quantity of air contained in the bladder, and its state. The urine varies much in its colour and contents. These varieties depend on age, sex, climate, diet, and other circumstances. In infants it is generally a clean watery fluid, without smell or taste. As we advance in life, it acquires more colour and smell, and becomes more impregnated with salts. In old people it becomes still more acid and fetid.

In a healthy state it is nearly of a straw colour. After being kept for some time, it deposits a tarry matter, which is found to be composed chiefly of earth and salt, and soon incrusts the sides of the vessel in which it is contained. While this separation is taking place, appearances like minute fibres or threads of a whitish colour may be seen in the middle of the urine, and an oily scum observed floating on its surface. So that the most common appearances of the urine are sufficient to ascertain that it is a watery substance, impregnated with earthy, saline, and oily particles.

The urine is not always voided of the same colour and consistence; for these are found to depend on the proportion of its watery part to that of its other constituent principles. Its colour and degree of fluidity seem to depend on the quantity of saline and inflammable particles contained in it: so that an increased proportion of these parts will constantly give the urine a higher colour, and add to the quantity of sediment.

The variety in the appearance of the urine, depends on the nature and quantity of solid and fluid aliment we take in; and it is likewise occasioned by the different state of the urinary vessels, by which we mean the channels through which it is separated from the blood, and conveyed through the pelvis into the ureters. The causes of calculous concretions in the urinary passages, are to be looked for in the natural constitution of the body, mode of life, &c.

It having been observed, that after drinking any light wine or Spa water, it very soon passed off by urine, it has been supposed by some, that the urine is not altogether conveyed to the bladder by the ordinary course of circulation, but that there must certainly exist some other shorter means of communication, perhaps by certain vessels between the stomach and the bladder, or by a retrograde motion in the lymphatics. But it is certain, that if we open the belly of a dog, press out the urine from the bladder, pass a ligature round the emulgent arteries, and then few up the abdomen, and give him even the most diuretic liquor to drink, the stomach and other channels will be distended.
ed with it, but not a drop of urine will be found to have passed into the bladder; or the same thing happens when a ligature is thrown round the two ureters. This experiment seems to be a sufficient proof, that all the urine we evacuate, is conveyed to the kidneys through the emulgent arteries, in the manner we have described. — It is true, that wine and other liquors promote a speedy evacuation of urine: but the discharge seems to be merely a speed of the fluxus they occasion; by which the bladder and urinary parts are solicited to a more copious discharge of the urine, which was before in the body, and not immediately of that which was last drunk; and this increased discharge, if the supply is kept up, will continue: nor will this appear wonderful, if we consider the great capacity of the vessels that go to the kidneys; the constant supply of fresh blood that is essential to health; and the rapidity with which it is incessantly circulated through the heart to all parts of the body.

Sect. XIII. Of Digestion.

We are now proceeding to speak of digestion, which seems to be introduced in this place with propriety, after a description of the abdominal visceræ, the greater part of which contribute to this function. By digestion is to be understood, the changes the aliment undergoes for the formation of chyle: these changes are effected in the mouth, stomach, and small intestines.

The mouth, of which every body has a general knowledge, is the cavity between the two jaws, formed anteriorly and laterally by the lips, teeth, and cheeks, and terminating posteriorly in the throat.

The lips and cheeks are made up of fat and muscles, covered by the cuticle, which is continued over the whole inner surface of the mouth, like a fine and delicate membrane. — Beside this membrane, the inside of the mouth is furnished with a spongy and very vascular substance called the gums, by means of which the teeth are secured in their sockets. A similar substance covers the roof of the mouth, and forms what is called the velum pendulum palati, which is fixed to the extremity of the arch formed by the soft maxillaries, and soft palate, and terminates in a soft pulp before it is conveyed into the mouth.

The velum pendulum palati performs the office of a valve between the cavity of the mouth and the pharynx, being moved by several muscles. — The tongue is composed of several muscles which enable it to perform a variety of motions for the articulation of the voice; for the purposes of mastication; and for conveying the aliment into the pharynx. Its upper part is covered with papillæ, which constitute the organ of taste, and are easily to be distinguished; it is covered by the same membrane that lines the underside of the mouth, and which makes at its inferior part towards its basis a reduplication called frenum. — Posteriorly, under the velum palati, and at the basis of the tongue, is the pharynx: which is the beginning of the oesophagus, stretched out every way, so as to resemble the top of a funnel, through which the aliment passes into the stomach.

The mouth has a communication with the nostrils at its posterior and upper part; with the ears, by the Eustachian tubes; with the lungs, by means of the larynx; and with the stomach, by means of the oesophagus.

The pharynx is constantly moistened by a fluid, secreted by two considerable glands called the tonsils, one on each side of the velum palati. These glands, from their supposed resemblance to almonds, have likewise been called amygdales.

The mouth is moistened by a considerable quantity of saliva. This fluid is derived from the parotid glands; a name which by its etymology points out its situation to be near the ears. They are two in number, one on each side under the os male: and they are of the conglomerate kind; being formed of many smaller glands, each of which sends out a very small excretory duct, which unites with the rest, to form one common channel, that runs over the cheek, and piercing the buccinator muscle, opens into the mouth on each side, by an orifice into which a bristle may be easily introduced. — Besides these, the maxillary glands, which are placed near the inner surface of the angle of the lower jaw on each side; the sublingual glands, which are situated at the root of the tongue; the glands of the palate, which are seated in the velum palati; and those of the cheeks, lips, &c. together with many other less considerable ones, — pour the saliva into the mouth through their several excretory ducts.

The saliva, like all the other humours of the body, is found to be different in different people: but in general, it is a limpid and insipid fluid, without smell in healthy subjects; and these properties would seem to prove that it contains very few saline or inflammable particles.

The uses of the saliva seem to be to moisten and lubricate the mouth, and to assist in reducing the aliment into a soft pulp before it is conveyed into the stomach.

The variety of functions which are constantly performed by the living body, must necessarily occasion a continual waste and dilipation of its several parts. A great quantity is every day thrown off by the insensible perspiration and other discharges; and were not these lothes constantly recruited by a fresh supply of chyle, the body would soon affect its own dilution. But nature has very wisely favoured us with organs fitted to produce such a supply: and has at the same time endowed us with the sensations of hunger and thirst, that our attention may not be diverted from the necessary business of nutrition. The sensation of hunger is universally

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(r) These are the circumflexus palati, levator palati mollis, palato-pharyngeus constrictor sphincter faucium and asygos uvula. See page 714.

(c) These are, the genio-glossus, hyo-glossus, lingualis, and stylo-glossus. See page 714.
Part III.

ANATOMY.

Of the Abdomen.

Versally known; but it would perhaps be difficult to describe it perfectly in words. It may, however, be done to a certain extent in the stomach, which is the organ of digestion, and which likewise serves to point out the proper quantity, and time for taking it. In describining the stomach, mention was made of the gastric juice, as every where lubricating its inner coat. This humour mixes itself with the aliment in the stomach, and helps to prepare it for its passage into the intestines; but when the stomach is perfectly empty, this same fluid irritates the coats of the stomach itself, and produces the sensation of hunger.

A certain proportion of liquid aliment is required to sift in the progress of digestion, and to afford that moisture to the body, of which there is such a constant dilution. —Thirst induces us to take this necessary supply of drink; and the fear of this dilution is in the tongue, fauces, and palatoglossus, which from their great sensitivity are required to be kept moist; for though the fauces are naturally moistened by the mucous and salival juices; yet the blood, when deprived of its watery part or rendered acrimonious by any natural causes, never fails particularly to affect these parts, and the whole alimentary canal, and to occasion thirst. —This is the common effect of fevers and of hard labour, by both which too much of the watery part of the blood is dilipated.

It has been observed, that the aliment undergoes some preparation in the mouth before it passes into the stomach; and this preparation is the effect of mastication. In treating of the upper and lower jaws, mention was made of the number and arrangement of the teeth. The upper jaw was described as being immovable; but the lower jaw was spoken of as being capable of elevation and depression, and of a grinding motion. The aliment, when first carried into the mouth, is pressed between the teeth of the two jaws by a very strong and frequent motion of the lower jaw; and the tongue and the cheeks assisting in this process, continue to replace the food between the teeth till it is perfectly divided, and reduced to the consistence of pulp. The incisors and canini divide it first into smaller pieces, but it is between the surfaces of the dentes molares by the grinding motion of the jaw that the mastication is completed.

During this process, the salival glands being gently compressed by the contraction of the muscles that move the lower jaw, pour out their saliva: this helps to divide and break down the food, which at length becomes a kind of pulp, and is then carried over the bals of the tongue into the fauces. But to effect this passage into the cesophagus, it is necessary that the other openings which were mentioned as having a communication with the mouth as well as the pharynx, should be closed; that none of the aliment, whether solid or liquid, may pass into them, whilst the pharynx alone is dilated to receive it: —And such a disposition actually takes place in a manner we will endeavour to describe.

The trachea arteria, or windpipe, through which the air is conveyed to the lungs, is placed before the cesophagus—In the act of swallowing; therefore, if the larynx (for the upper part of the trachea is called) is not closed, the aliment will pass into it in its way to the cesophagus. But this is prevented by a small and very elastic cartilage, called epiglottis, which is attached only to the fore-part of the larynx; so that the food in its passage to the cesophagus presses down this cartilage, which then covers the glottis of the larynx; and at the same time the velum palati, being capable of some degree of motion, is drawn backwards by its muscles, and closes the openings into the nose and the Eustachian tubes. —This, however, is not all. The larynx, which being composed of cartilaginous rings, cannot fail in its ordinary state to compress the membranous canal of the cesophagus, is in the act of deglutition carried forwards and upwards by muscles defined for that purpose; and consequently drawing the fore-part of the pharynx with it, that opening is fully dilated. When the aliment has reached the pharynx, its descent is promoted by its own proper weight, and by the mucular fibres of the cesophagus, which continue to contract from above downwards, until the aliment has reached the stomach. That these fibres have no considerable share in deglutition, any person may experience, by swallowing with his head downwards, when the descent of the aliment cannot possibly be effected by its weight.

It is necessary that the nostrils and the lungs should communicate with the mouth, for the purposes of speech and respiration; but if the most minute part of our food happens to be introduced into the trachea, it never fails to produce a violent cough, and sometimes the most alarming symptoms. This is liable to happen whenever we laugh or talk in the act of deglutition; the food is then said to have passed the wrong way. And indeed this is not improperly expressed: for death would soon follow, if the quantity of aliment introduced into the trachea should be sufficient to obstruct the respiration only during a very short time; or if the irritating particles of food should not soon be thrown up again by means of a cough, which in these cafes very feazonably increases in proportion to the degree of irritation.

If the velum palati did not close the passage to the nostrils, deglutition would be performed with difficulty, and perhaps not at all, for the aliment would return through the nose, as is frequently the case in drinking. Children, from a delicacy in this velum palati, have been seen to die a few hours after birth; and they who from disease or any other cause have not this part perfectly, swallow with difficulty.

The aliment, after having been sufficiently divided by the action of the teeth, and attenuated by the tali,va, is received into the stomach, where it is destined to undergo a more considerable change.

The properties of the aliment not being much altered at its first entrance into the stomach, and before it is thoroughly blended with the gastric juice, is capable of irritating the inner coat of the stomach to a certain degree, and occasions a contraction of its two orifices. —In this membranous bag, surrounded by the abdominal viscera, and with a certain degree of natural heat, the aliment undergoes a constant agitation by means of the abdominal muscles and of the diaphragm, and likewise by a certain contraction or expansion of the mucular fibres of the stomach itself. By this motion, every part of the food is exposed to the action of the gastric juice, which gradually divides and attenuates it, and prepares it for its passage into the intestines.

Some.
Some observations lately published by Mr Hunter in the Philosophical Transactions, tend to throw considerable light on the principles of digestion. There are few dead bodies in which the stomach, at its great end, is not found to be in some degree digested (u). Animals, or parts of animals, that have been digested, or subjected to their digestive powers, or that have been in the stomach, are not in the least affected by the action of that viscus; but the moment they lose the living principle, they become subject to its digestive powers. This seems to be the case with the stomach, which is enabled to refist the action of its juices in the living body: but when deprived of the living principle, it is then no longer able to refist the powers of that membrane, which it had itself formed for the digestion of its contents; the process of digestion appearing to be continued after death. This is confirmed by what happens in the stomachs of fish: They frequently swallow, without mastication, filth which are larger than the digesting parts of their stomach can contain; and in such cases, that part which is taken into the stomach is more or less dissolved, while that part which remains in the oesophagus is perfectly found; and here, as well as in the human body, the digesting part of the stomach is often reduced to the same state as the digested part of the food. These appearances tend to prove, that digestion is not effected by a mechanical power, by contractions of the stomach, or by heat; but by a fluid secreted in the coats of the stomach, which is poured into its cavity, and there animalizes the food, or assimilates it to the nature of blood.

From some late experiments by M. Sage, it appears, that inflammable air has the property of destroying and dissolving the animal texture: And as we swallow with the substances which serve us for food a great quantity of atmospheric air, M. Sage thinks it possible, that denphilogliticated, which is its principle, may be converted in the stomach into inflammable air, or may modify into inflammable air a portion of the oily substance which is the principle of aliments. In this case, would not the inflammable air (he asks), by dissolving our food, facilitate its conversion into chyle?

Be this as it may, the food, after having remained one, two, or three hours in the stomach, is converted into a creythil pulp, which is usually called chymus. A word of Greek etymology, signifying juice, and some few milky or chylous particles begin to appear. But the term of its residence in this bag is proportioned to the nature of the aliment, and to the state of the stomach and its juices. The thinner and more perfectly digested parts of the food pass by a little at a time into the duodenum, through the pylorus, the fibres of which relax to afford its passage; and the groffer and less digested particles remain in the stomach, till they acquire a sufficient fluidity to pass into the intestines, where the nature of the chymus is perfectly changed. The bile and pancreatic juice which flow into the duodenum, and the mucous, which is every where diffus'd from the surface of the intestines, mix themselves with the alimentary pulp which they still further attenuate and diffuse, and into which they seem to infuse new properties.

Two matters very different from each other in their nature and destination, are the result of this combination. One of these, which is composed of the liquid parts of the aliment, and of some of its more solid particles, extremely divided and mixed with the juices we have described, constitutes a very mild, sweet, and whitish fluid, resembling milk, and distinguished by the name of chyle. This fluid is absorbed by the lacteal veins, which convey it into the circulation, where, by being assimilated into the nature of blood, it affords that supply of nutrition, which the continual waste of the body is found to require. The other, is the remains of the alimentary mafa deprived of all its nutritious particles, and containing only such parts as were rejected by the absorbing mouths of the lacteals. This greater part, called the fæces, passes on through the course of the intestines, to be voided at the anus, as will be explained hereafter; for this process in the economy cannot be well understood till the motion of respiration has been explained. But the structure of the intestines is a subject which may be properly described in this place, and deserves to be attended to.

It has been already observed, that the intestinal canal is five or six times as long as the body, and that it forms many circumvolutions in the cavity of the abdomen, which it traverses from the right to the left, and again from the left to the right; in one place descending, and in another extending itself upwards. It was noticed likewise, that the inner coat of the intestines, by being more capacious than their exterior tunics, formed a multitude of plaits placed at a certain distance from each other, and called valvulæ conniventes. Now this disposition will be found to afford a farther proof of that divine wisdom, which the anatomist and physiologist cannot fail to discover in all their pursuits.

—For if the intestinal canal was much shorter than it naturally is; if instead of the present circumvolutions it passed in a direct course from the stomach; and if its inner surface was smooth and destitute of valves; the aliment would consequently pass with great rapidity to the anus, and sufficient time would be wanting to assimilate the chyle, and for the necessary absorption of it into the lacteals: so that the body would be deprived of the supply of nutrition, which is so essential to life and health; but the length and circumvolutions of the intestines, the inequality of their internal surface,

(u) The Abbé Spallanzani, who has lately written upon digestion, finds, from a variety of experiments, made upon quadrupeds, birds, and fishes, that digestion goes on for some time after death, though far less considerable than in living animals; but heat is necessary in many animals, or at least promotes it in a much greater degree. He found also, that when the stomach was cut out of the body, it had somewhat of the power of digestion, though this was trifling when compared with that which took place when the stomach was left in the body. In not one of the animals was the great curvature of the stomach dissolved, or much eroded after death. There was often a little erosion, especially in different fishes; in which, when he had cleared the stomach of its contents, the internal coat was wanting. In other animals there was only a slight excoriation; and the injury
Of the Abdomen.

Part III.

ANATOMY.

Sec. XIV. Of the Course of the Chyle, and of the Lymphatic System.

An infinite number of very minute vessels, called the lacteal veins, arise like net-work from the inner surface of the intestines, (but principally from the jejunum and ilium,) which are defined to imbibe the nutritious fluid or chyle. These vessels, which were discovered by Asellius in 1622 (1), pass obliquely through the coats of the intestine, and running along the mesentery, unite as they advance, and form larger branches, all of which pass through the mesenteric or conglobate glands, which are very numerous in the human subject. As they run between the intestines and these glands, they are styled vena lactea primus genus: but after leaving these glands, they are found to be less numerous, and being increased in size, are then called vena lactea secundum genus, which go to deposit their contents in the thoracic duct, through which the chyle is conveyed into the blood.

This thoracic duct begins about the lower part of the first vertebra lumbarum, from whence it passes up by the side of the aorta, between that and the vena azygos, close to the vertebrae, being covered by the pleura. Sometimes it is found divided into two branches; but they usually unite again into one canal, which opens into the left subclavian vein, after having run a little way in an oblique course between its coats. The subclavian vein communicates with the vena cava, which passes to the right articles of the heart.

The lower part of this duct being usually larger than any other part of it, has been named receptaculum chyli, or Pequot’s receptacle, in honour of the anatomist who first discovered it in 1651. In some quadrupeds, * Henfax’s in turtle* and in fowl, this enlargement * is more considerable in proportion to the size of the duct, than it usually is in the human subject, where it is not commonly found large enough to merit the name of receptaculum.

Opportunities of observing the lacteals in the human subject do not often occur; but they may be easily demonstrated in a dog or any other quadruped that is killed two or three hours after feeding upon milk, for then they appear filled with white chyle.

But these lacteals which we have described, as passing from the intestines through the mesentery to the thoracic duct, compose part only of a system of vessels which perform the office of absorption, and which constitute, with their common trunk the thoracic duct, and the conglobate glands that are dispersed through the body, what may be styled the lymphatic system. So that what is said of the structure of one of these series of vessels may very properly be applied to that of the other.

The lymphatic veins (K) are minute pellucid tubes, Lymphatic, which, like the lacteals, direct their course towards the centre of the body, where they pour a colourless fluid into the thoracic duct. The lymphatics from all the lower parts of the body gradually unite as they approach this duct, into which they enter by three or four very large trunks, that seem to form the lower extremity of this canal, or receptaculum chyli, which may be considered as the great trunk of the lymphatic system. The lacteals open into it near the same place; and the lymphatics, from a large share of the upper parts of the body, pour their lymph into different parts of this duct as it runs upwards, to terminate in the left subclavian vein. The lymphatics from the right side of the neck, thorax, and right arm, &c. terminate in the right subclavian vein.

As the lymphatics commonly lie close to the large blood-vessels, a ligature passed round the crural artery in a living animal, by including the lymphatics, will occasion a distention of these vessels below the ligature, so as to demonstrate them with ease; and a ligature passed round the thoracic duct, instantly after killing an animal, will, by stopping the course of its contents,
A NAT O M Y.

* Sur le mouvement du sang. Ex. 293, 298.

1. The Male Organs.

THE male organs of generation have been usually divided into the parts which serve to prepare the semen from the blood, and those which are destined to convey it into the womb. But it seems to be more proper to distinguish them into the preparing, the containing, and the expelling parts, which are the different offices of the testes, the vesiculae seminales, and the penis; and this is the order in which we propose to describe them.

The testes are two glandular bodies, serving to secrete the semen from the blood. They are originally formed and lodged within the cavity of the abdomen; and it is not till after the child is born, or very near that time, that they begin to pass into the groin, and from thence into the ferorum (m). By this disposition they

In the dead body they may be easily demonstrated by opening the artery ramifying through any viscus, as in the spleen, for instance, and then throwing in air; by which the lymphatics will be dilated. One of them may then be punctured, and mercury introduced into it through a blow-pipe.

It sometimes happens in dissecting ruptures, that the intestine is found in the same sac, and in contact with the testes. This appearance was at first attributed to a supposed laceration of the peritoneum; but later observations, by pointing out the fixation of the testicles in the fossa, have led to prove, that the testicles, as it defends into the ferorum, carries with it a portion or elongation of the peritoneum, which becomes its tunica vaginalis, or a kind of sac, in which the testicle is lodged, as will be explained in the course of this section.

The communication between this sac and the cavity of the abdomen, is usually soon cut off; but in some subjects
Part III. ANATOMY.

Of the Abdomen.

they are very wisely protected from the injuries to which they would be liable to be exposed, from the different positions of the child at the time of parturition.

The testicles in this state are loosely attached to the psoas muscles, by means of the peritoneum by which they are covered; and they are at this time of life connected in a very particular manner to the parietes of the abdomen, and likewise to the ferrotum, by means of a sub stance which Mr. Hunter calls the ligament or gubernaculum testis, because it connects the testicles with the ferrotum, and directs its course in its descent. This gubernaculum is of a pyramidal form, with a bulbous head fixed to the lower end of the testicle and epididymis, and looses its lower and slender extremity in the cellular membrane of the ferrotum. It is difficult to ascertain what the structure and composition of this gubernaculum is, but it is certainly vascular and fibrous; and, from certain circumstances, it seems to be in part composed of the cremaster muscle, running upwards to join the lower end of the testicle.

We are not to suppose that the testicle, when descended into the ferrotum, is to be seen loose as a piece of gut or omentum would be in a common hernial sac. But the same is, no doubt, to be seen loose in the ferrotum before the gubernaculum testis, from the abdomen they descend through the abdominal furrounds the testicle, closely attached behind to the peritoneal, which is closely invested with the cremaster muscle, and becomes united to the posterior part, and thus perfectly surrounds the testicle as it were in a purse.

The testicles of the fetus differ only in their size and situation from those of the adult. In their passage from the abdomen they descend through the abdominal rings into the ferrotum, where they are supported and defended by various integuments.

What the immediate cause of this descent is, has not yet been satisfactorily determined. It has been ascribed to the effect of respiration, but the testicles have sometimes been found in the ferrotum before the child has breathed; and it does not seem to be occasioned by the action of the cremaster muscle, because the same effect would be liable to happen to the hedgehog, and some other quadrupeds, whose testicles remain in the abdomen during life.

The ferrotum, which is the external or common covering of both testicles, is a kind of sac formed by the common integuments, and externally divided into two equal parts by a prominent line called the raphe.

In the inner part of the ferrotum we meet with a cellular coat called the dartos (s), which by its duplicature divides the ferrotum into two equal parts, and forms what is called the septum ferarii, which corresponds with the raphe. The division which is so often observed to take place in the ferrotum of the healthy subject, when excited by cold or by the stimulus of venery, seems to be very properly attributed to the contractile motion of the skin, and not to any muscular fibres, as is the case in dogs and some other quadrupeds.

The ferrotum, then, by means of its septum, is found to make two distinct bags, in which the testicles, in their passage through the abdominal cavity, are loosely lodged and separated from each other. These coats are the cremaster, the tunica vaginalis, and the tunica albuginea. The first of these is composed of muscular fibres, and is to be considered only as a partial covering of the testicle; for it surrounds only the spermatic chord, and terminates upon the upper and external parts of the tunica vaginalis testis, serving to draw up and suspend the testicle (o). The tunica vaginalis testis has already been described as being a thin production of the peritoneum, loosely adhering everywhere to the testicle, which it includes as it were in a bag. The tunica albuginea is a firm, white, and very compact membrane of a glistering appearance, which immediately invests the body of the testicle and the epididymis; serving in some measure to connect them to each other, but without extending itself at all to the spermatic chord. This tunica albuginea serves to confine the growth of the testicle and epididymis within certain limits, and by giving them a due degree of firmness, enables them to perform their proper functions.

Having removed this last tunic, we discover the substance of the testicle itself, which appears to be made up of an infinite number of very elastic filaments, which may be best distinguished after macerating the testicle in water. Each testicle is made up of the spermatic artery and vein, and the excretery vessels or tubuli feminiferi. There are likewise a great number of absorbent vessels, and some branches of nerves to be met with in the testicles.

The spermatic arteries arise one on each side from the aorta, generally about an inch below the emunctory. The right spermatic vein commonly passes into the vena cava; but the left spermatic vein usually empties itself into the emunctory on that side; and it is suppos...
ANATOMY.

Of the Abdomen.

As this latter fluid of the testicle is obliged to do in its course to the seminal vesicle, it deposits the semen, which by an infinite number of convolutions form a quantity of spermatogenous semen, that is discharged by ten or twelve excretory ducts into the urethra, on each side of the openings of the vesiculae seminales at the same time, and from the same causes that the semen is expelled. As this latter fluid is found to be exceedingly limpid in the vesiculae seminales of the dead subject, it probably owes its whiteness and viscidity to this liquor of the prostatc.

The penis, which is to be considered as the vehicle or active organ of procreation, is composed of two columns, the corpora cavernosa, and corpus spongiosum. The corpora cavernosa, which constitute the greatest part of the penis, may be described as two cylindrical ligamentous tubes, each of which is composed of an infinite number of minute cells of a spongy texture, which communicate with each other. These two bodies are of a very plant texture, and capable of considerable dilatation; and being united laterally to each other, occasion by this union a space above and another below. The uppermost of these spaces is filled by the blood vessels, and the lower one, which is larger than the other, by the urethra and corpus spongiosum. These two cavernous bodies are at first only separated by a partition of tendinous fibres, which allow them to communicate with each other; but they afterwards deviate from each other like the branches of the letter Y, and diminishing gradually in size, are attached.

(p) The testicles were named didymi by the ancients, and the name of this part was given to it on account of its situation upon the testicle.

(q.) That the bags called vesiculae seminales are reservoirs of semen, is a circumstance which has been by anatomists universally believed. Mr. J. Hunter, however, from several circumstances, has been induced to think this opinion erroneous.

He has examined these vesiculae in people who have died suddenly, and he found their contents to be different in their properties from the semen. In those who had lost one of the testicles, or the use of one of them, by disease, both the vesiculae were full, and their contents similar. And in a fetus naturae, where there was no communication between the vasa deferentia and vesiculae, nor between the vesiculae and penis, the same thing took place.

From these observations, he thinks we have a presumptive proof, that the semen can be absorbed in the body of the testicle and in the epididymis, and that the vesiculae secrete a mucus which they are capable of absorbing when it cannot be made use of: That the semen is not retained in reservoirs after it is secreted, and kept there till it is used; but that it is secreted at the time, in consequence of certain affections of the mind stimulating the testicles to this action.

He corroborates his observations by the appearance on dissection in other animals; and here he finds, That the shape and contents of the vesiculae vary much in different animals, while the semen in most of them he has examined is nearly the same: That the vasa deferentia in many animals do not communicate with the vesiculae: That the contents of the vesiculae of castrated and perfect animals are similar, and nearly equal in quantity, in no way resembling the semen as emitted from the animal in covo, or what is found in the vasa deferentia after death. He observes likewise, that the bulb of the urethra of perfect males is considerably larger than in castrated animals.

From the whole, he thinks the following inferences may be fairly drawn: That the bags called vesiculae seminales are not seminal reservoirs, but glands secreting a peculiar mucus; and that the bulb of the urethra is properly speaking the receptacle of the semen, in which it is accumulated previous to ejection.

But although he has endeavoured to prove that the vesiculae do not contain the semen, he has not been able to ascertain their particular use. He thinks, however, we may be allowed upon the whole to conclude, that they are, together with other parts, subservient to the purposes of generation.

Although the author has treated this subject very ably, and made many ingenious observations, some things may be objected to what he had advanced; of which the following are a few: That those animals who have
of the abdomen.

The corpus spongiosum penis, or corpus spongiosum urethrae, as it is styled by some authors, begins as soon as the urethra has passed the profate, with a thick origin almost like a heart, first under the urethra, and afterwards above it, becoming gradually thinner, and surrounding the whole canal of the urethra, till it terminates in a considerable expansion, and constitutes what is called the glans penis, which is exceedingly vascular, and covered with papillae like the tongue. The cuticle which lines the inner surface of the urethra, is continued over the glans in the same manner as it is spread over the lips.

The penis is invested by the common integuments, but the cutis is reflected back every where from the glans as it is in the eye-lids; so that it covers this part, when the penis is in a relaxed state, as it were with a hood, and from this use is called prepuce.

The prepuce is tied down to the under part of the glans by a small ligament called frenum, which is in fact only a continuation of the cuticle and cutis. There are many simple sebaceous follicles called glandulae odoriferae, placed round the basis of the glans; and the fluid they secrete serves to preserve the exquisite fineness of this part of the penis, and to prevent the ill effects of attrition from the prepuce.

The urethra may be defined to be a membranous canal, passing from the bladder through the whole extent of the penis. Several very small openings called lacunae, communicate with this canal, through which a mucous is discharged into it; and besides these, there are two glands, first described by Cowper, as secreting a fluid for lubricating the urethra, and called Cowper's glands (a); and Littre* speaks of a gland situated near the prostatic, as being destined for the same use.

The urethra being continued from the neck of the bladder, is to be considered as making part of the urinary passage; and it likewise affords a conveyance to the fermen, which we have observed is occasionally discharged into it from the vesicles feminales. The direction of this canal being first under and then before the pubis, occasions a winding in its course from the bladder to the penis not unlike the turns of the letter S.

The penis has three pair of muscles, the erecctores, acceleratores, and tranversales. They push the blood from the crura to the fore part of the corpora cavernosa. The first originate from the tuberosity of the ischium, and terminate in the corpora cavernosa. The acceleratores arise from the sphincter, and by their involuntary motion to compress the bulbous part of the urethra; and the tranversales are destined to afford a passage to the fermen, by dilating the canal of the urethra.

The arteries of the penis are chiefly derived from the internal iliacs. Some of them are supposed to terminate by a considerable number of orifices within the corpora cavernosa and corpus spongiosum; and others terminate in veins, which at last make up the vena magna dorsi penis, and other smaller veins, which are in general distributed in like order with the arteries.

Its nerves are large and numerous. They arise from the great sciatic nerve, and accompany the arteries in their course through the penis.

We have now described the anatomy of this organ; and there only remains to be explained, how it is enabled to attain that degree of firmness and duration which is essential to the great work of generation.

The greatest part of the penis has been spoken of as being of a spongy and cellular texture, plentifully supplied with blood-vessels and nerves, and as having muscles to move it in different directions. Now, the blood is constantly passing into its cells through the small branches of the arteries which open into them, and from thence as constantly returned by the veins, so long as the corpora cavernosa and corpus spongiosum continue to be in a relaxed and flaccid state. But when, from any nervous influence, or other means, which it is not necessary here to define or explain, the erecctores penis, ejaculatori feminis, levatores ani, &c. are induced to contract, the veins undergo a certain degree of compression, and the passage of the blood through them is so much impeded, that it collects in them in a greater proportion than they are enabled to carry off, so that the penis gradually enlarges; and being more and more forcibly drawn up against the os pubis, the vena magna itself is at length compressed, and the penis becomes fully distended. But as the cause which first occasioned this diffusion subsides, the penis gradually returns to its state of relaxation.

ANATOMIC writers usually divide the female organs of generation into external and internal. In the first division they include the montveseris, labia pudendi, perineum, clitoris, mons, and carunculae myrtiformes; and in the latter, the vagina with the uteru and its appendages.

§ 2. Female Organs of Generation.

ANATOMICAL writers usually divide the female organs of generation into external and internal. In the first division they include the mons veneris, labia pudendi, perineum, clitoris, mons, and carunculae myrtiformes; and in the latter, the vagina with the uterus and its appendages.

(a) Both Heister and Morgagni observe, that they have sometimes not been able to find these glands; so that they do not seem to exist in all subjects.

bags called vesiculae feminales perform copulation quickly; whereas others that want them, as in the dog kind, are tedious in copulation: That in the human body, at least, there is a free communication between the vasa deferentia and vesiculae; and in animals where the author has observed no communication between the vasa deferentia and vesiculae, there may be a communication by vesiculae not yet discovered, and which may be compared to the hepato-cystic ducts in fowls and fishes: That the fluid in the end of the vasa deferentia and the vesiculae feminales are similar, according to the author's own observation: That the vesiculae in some animals increase and decrease with the tenuity at particular seasons: That in birds and certain fishes, there is a dilatation of the ends of the vasa deferentia, which the author himself allows to be a reservoir for the fermen.

With regard to the circumstance of the bulb of the urethra answering the purpose of a reservoir, the author has mentioned no facts which tend to establish this opinion. See observations on certain parts of the Animal Economy.
The meson cocudri, which is placed on the upper part of the symphysis pubis, is internally composed of adipose membranes, which makes it soft and prominent: it divides into two parts called labia pudendi, which descending towards the rectum, from which they are divided by the perineum, form what is called the fourchette. The perineum is that flabby space which extends about an inch and an half from the fourchette to the anus, and from thence about two inches to the coccyx.

The labia pudendi being separated, we observe a fulcus called fossa magna; in the upper part of which is placed the clitoris, a small round spongy body, in some measure resembling the male penis; but impervious, composed of two corpora cavernosa, arising from the tuberosities of the os ischii; furnished with two pair of nurface, the erecrotor clitoridis, and the sphincter or constrictor offii vaginae; and terminating in a glans, which is covered with its prepuce. From the lower part, on each side of the fossa, past the nympha, two membranous and spongy folds which seem defined for useful purposes in parturition, by tending to enlarge the volume of the vagina as the child's head passes through it. Between these, about the middle of the fossa magna, we perceive the orifice of the vagina or os externum, closed by folds and wrinkles; and about half an inch above this, and about an inch below the clitoris, appears the meatus urinary or orifice of the urethra, much shorter, though somewhat larger, than in men, with a little prominence at its lower edge, which facilitates the introduction of the catheter.

The os externum is surmounted internally by several membranous folds called sarunulae myrtiformes, which are partly the remains of a thin membrane called hymen, that covers the vagina in children. In general the hymen is sufficiently open to admit the passage of the menstes, if it exists at the time of their appearance; sometimes, however, it has been found perfectly closed.

The vagina, situated between the urethra and the rectum, is a membranous cavity, surmounted especially at its external extremity with a spongy and vacular substance, which is covered by the sphincter offii vaginae. It terminates in the uterus, about half an inch above the os tinece, and is wider and shorter in women who have had children than in virgins.

All these parts are plentifully supplied with blood vessels and nerves. Around the nympha there are sebaceous follicles, which pour out a fluid to lubricate the inner surface of the vagina; and the meatus urinarius, like the urethra in the male subject, is constantly moistened by a nucus, which defends it against the acrimony of the urine.

The uteru is a hollow viscus, situated in the hypogastrie region between the rectum and bladder. It is destined to receive the first rudiments of the foetus, and to afford in the development of all its parts, till it arrives at a state of perfection, and is fitted to enter into the world, at the time appointed by the wife author of nature.

The uteru, in its unimpregnated state, resembles a pear in shape, somewhat flattened, with its fundus or bottom part turned towards the abdomen, and its cervix or neck surrounded by the vagina. The entrance into its cavity forms a little protuberance, which has been compared to the mouth of a trench, and is therefore called os tinece.

The substance of the uterus, which is of a confiderable thickness, appears to be composed of mucous and small ligamentous fibres, small branches of nerves, some lymphatics, and with arteries and veins innumerable. Its nerves are chiefly derived from the intercostal, and its arteries and veins from the hypogastric and spermatic. The membrane which lines its cervix, is a continuation of the inner membrane of the vagina, but the outer surface of the body of the uterus is covered with the peritoneum, which is reflected over it, and descends from thence to the intestinum rectum. This duplication of the peritoneum, by passing off from the sides of the uterus to the sides of the pelvis, is there firmly connected, and forms what are called ligamenta uteri latera; which not only serve to support the uterus, but to convey nerves and blood vessels to it.

The ligamenta uteri rotunda arise from the sides of the fundus uteri, and passing along within the fore-part of the ligamenta lata, descend through the abdominal rings, and terminate in the substance of the mons veneris. The substance of these ligaments is vascular, and although both they and the ligamenta lata admit the uterus in the virgin state, to move only about an inch up and down, yet in the course of pregnancy they admit of considerable defension, and after parturition return nearly to their original state with surprising quicknesses.

On each side of the inner surface of the uterus, in the angle near the fundus, a small orifice is to be discovered, which is the beginning of one of the tubes fallopiana. Each of these tubes, which are two in number, passing through the substance of the uterus, is extended along the broad ligaments, till it reaches the edge of the pelvis, from whence it reflects back; and turning over behind the ligaments, about an inch of its extremity is seen hanging loose in the pelvis, near the ovarium. These extremities, having a jagged appearance, are called fimbrize, or morfus diaboli. Each tube fallopiana is usually about three or four inches long. Their cavities are at first very small, but become gradually larger, like a trumpet, as they approach the fimbrize.

Near the fimbrize of each tube Fallopiana, about an inch from the uterus, is situated an oval body called ovarium, of about half the size of the male testicle. Each of these ovaria is covered by a production of the peritoneum, and hangs loose in the pelvis. They are of a flat and angular form, and appear to be composed of a white and cellular substance, in which we are able to discover several minute vessels filled with a coagulable lymph, of an uncertain number, commonly exceeding 12 in each ovary. In the female of ripe years, these vessels become exceedingly turgid, and a kind of yellow coagulum is gradually formed within one of them, which increases for a certain time. In conception, one of these mature ova is supposed to be impregnated with the male semen, and to be squeezed out of its nidus into the Fallopian tube; after which the ruptured part forms a substance which in some animals is of a yellow colour, and is therefore called corpus luteum; and it is observable, that the number of these scars or sifures in the ovarium, constantly corresponds with the number of foetuses excluded by the mother.
Man, being ever curious and inquisitive, has naturally been led to inquire after the origin of his existence; and the subject of generation has employed the philosophical world in all ages: but in following nature up to her minute recitals, the philosopher soon finds himself bewildered, and his imagination often supplies that which he so eagerly wishes to discover, but which is defined perhaps never to be revealed to him. Of the many theories which have been formed on this subject, that of the ancient philosophers seems to have been the most simple: they considered the male semen as alone capable of forming the fetus, and believed that the female only afforded it a lodging in the womb, and supplied it with nourishment after it was perfectly formed. This opinion, however, soon gave place to another, in which the female was allowed a more considerable share in conception.

This second system considered the fetus as being formed by the mixture of the seminal liquor of both sexes, by a certain arrangement of its several particles in the uterus. But in the 16th century, vehicles or eggs were discovered in the ovaria or female testicles; the fetus had been found sometimes in the abdomen, and sometimes in the Fallopian tubes; and the two former opinions were exploded in favour of a new doctrine. The ovaria were compared to a bunch of grapes, being supposed to contain vehicles, each of which had a stalk; so that it might be disengaged without hurting the rest, or spilling the liquor it contained. Each vehicle was said to include a little animal, almost complete in all its parts; and the vapour of the male semen being conveyed to the ovarium, was supposed to produce a fermentation in the vehicle, which approached the nearest to maturity; and thus inducing it to disengage itself from the ovarium, it passed into the tuba Fallopiana, thro' which it was conveyed to the uterus. Here it was supposed to take root like a vegetable seed, and to form, with the vehicles originating from the uterus, what is called the placenta; by means of which the circulation is carried on between the mother and the fetus.

This opinion, with all its absurdities, continued to be almost universally adopted till the close of the same century, when Liewenhoek, by means of his glasses discovered certain opaque particles, which he described as so many animalcules, floating in the seminal fluid of the male.

This discovery introduced a new scheme among the philosophers of that time, and gave rise to a system which is not yet entirely exploded. According to this theory the male semen passing into the tube Fallopiana, one of the animalcules penetrates into the substance of the ovarium, and enters into one of its vehicles or ovum. This impregnated ovum is then squeezed from its hull, through the coats of the ovarium, and being feized by the fimblure, is conducted through the tube to the uterus, where it is nourished till it arrives at a state of perfection. In this system there is much ingenuity; but there are certain circumstances supposed to take place, which have been hitherto inexplicable. A celebrated modern writer, M. Buffon, endeavours to restore, in some measure, the most ancient opinion, by allowing the female semen a share in this office; affirming, that animalcules or organic particles are to be discovered in the seminal liquor of both sexes: he derives the female semen from the ovaria, and he contends that no ovum exists in those parts. But in this idea he is evidently mistaken; and the opinion now most generally adopted is, that an impregnation of the ovum, by the influence of the male semen, is essential to conception (a). That the ovum is to be impregnated, there can be no doubt; but as the manner in which such an impregnation is supposed to take place, and the means by which the ovum afterwards gets into the Fallopian tube, and from thence into the uterus, are still founded chiefly on hypothesis, we will not attempt to extend farther the investigation of a subject concerning which so little can be advanced with certainty.

Opportunities of differing the human gravid uterus occurring but seldom, the state of the embryo (b) immediately after conception cannot be perfectly known.

When the ovum descends into the uterus, it is supposed to be very minute; and it is not till a considerable time after conception that the rudiments of the embryo begin to be ascertained.

About the third or fourth week the eye may discover the first lineaments of the fetus; but these lineaments are as yet very imperfect, it being only about the size of a horse-fly. Two little vehicles appear in an almost transparent jelly; the largest of which is defined to become the head of the fetus, and the other smaller one is reserved for the trunk. But at this period no extremities are to be seen; the umbilical cord appears only as a very minute thread, and the placenta does not as yet absorb the red particles of the blood. At six weeks, not only the head but the features of the face begin to be developed. The nose appears like a small prominent line, and we are able to discover another line under it, which is defined for the separation of the lips. Two black points appear in the place of eyes, and two minute holes mark the ears. At the sides of the trunk, both above and below, we see four minute protuberances, which are the rudiments of the arms and legs. At the end of eight weeks the body of the fetus is upwards of an inch in length, and both the hands and feet are to be distinguished. The upper extremities are found to increase faster than the lower ones, and the separation of the fingers is accomplished sooner than that of the toes.

At this period the human form may be decisively ascertained; all the parts of the face may be distinctly distinguished.
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But as we have not an opportunity of examining the same fetus at different periods of pregnancy, and as their size and length may be influenced by the constitution and mode of life of the mother, calculations of this kind must be very uncertain.

The fetus during all this time assumes an oval figure, which corresponds with the shape of the uterus. Its chin is found reclining on its breast with its knees drawn up towards its chin, and its arms folded over them. But it seems likely, that the posture of some of these parts is varied in the latter months of pregnancy, so as to cause those painful twitches which its mother usually feels from time to time. In natural cases, its head is probably placed towards the os tincae from the time of conception to that of its birth; though formerly it was considered as being placed towards the fundus uteri till about the eighth or ninth month, when the head, by becoming specifically heavier than the other parts of the body, was supposed to turn as it descends.

The capacity of the uterus increases in proportion to the growth of the fetus, but without becoming thinner in its substance, as might naturally be expected. The nourishment of the fetus, during all this time, seems to be derived from the placenta, which appears to be originally formed by that part of the ovum which is next the fundus uteri. The remaining part of the ovum is covered by a membrane called the spongy chorion (v); within which is another called true chorion, which includes a third termed amnios (v): this contains a watery fluid, which is the liquor amnii (w), in which the fetus floats till the time of its birth. On the side next the mother it has a production continued from the spongy chorion. The amnios and chorion are remarkably thin and transparent, having no blood-vessels entering into their composition. The spongy chorion is opaque and vascular.

In the first months of pregnancy, the involucre bears a large proportion to its contents; but this proportion is afterwards reversed as the fetus increases in bulk.

The placenta, which is the medium through which the blood is conveyed from the mother to the fetus, and the manner in which this conveyance takes place, deserve next to be considered.

The placenta is a broad, flat, and spongy substance, like a cake, closely adhering to the inner surface of the womb, usually near the fundus, and appearing to be chiefly made up of the ramifications of the umbilical arteries and vein, and partly of the extremities of the uterine vessels. The arteries of the uterus discharge their contents into the substance of this cake; and the veins of the placenta, receiving the blood either by a direct communication of vessels, or by absorption, at length form the umbilical vein, which passes on to the sinus of the vena portae, and from thence to the vena cava, by means of the canalis venofus, a communication that is closed in the adult. But the circulation of the blood through the heart is not conducted in the fetus as in the adult: in the latter, the blood is carried from the right auricle of the heart through the pulmonary artery, and is returned to the left auricle by the pulmonary vein; but a dilatation of the lungs is essential to the passage of the blood through the pulmonary veins, and this dilatation cannot take place till after the child is born and has expired. This deficiency, however, is supplied in the fetus by the immediate communication between the right and left auricle, through an oval opening, in the septum which divides the two auricles, called foramen ovale. The blood is likewise transmitted from the pulmonary artery to the aorta, by means of a duct called canalis arteriosus, which, like the canalis venosus, and foramen ovale, gradually closes after birth.

The blood is returned again from the fetus through two arteries called the umbilical arteries, which arise from the iliacs. These two vessels taking a winding course with the vein, form with that, and the membranes by which they are surrounded, what is called the umbilical chord. These arteries, after ramifying through the substance of the placenta, discharge their blood into the veins of the uterus; in the same manner as the uterine arteries discharged their blood into the branches

(v) Dr Hunter has described this as a lamella, from the inner surface of the uterus. In the latter months of pregnancy it becomes gradually thinner and more connected with the chorion: he has named it membrana caduca, or decidua, as it is cast off with the placenta. Signior Scarpa, with more probability, considers it as being composed of an infiltrated coagulable lymph.

(v) In some quadrupeds, the urine appears to be conveyed from the bladder through a canal called uracus, to the atlantois, which is a reservoir, resembling a long and blind gut, situated between the chorion and amnios. The human fetus seems to have no such reservoir, though some writers have supposed that it does exist. From the top of the bladder a few longitudinal fibres are extended to the umbilical chord; and these fibres have been considered as the uracus, though without having been ever found pervious.

(w) The liquor amnii coagulates like the lymph. It has been supposed to pass into the esophagus, and to afford nourishment to the fetus; but this does not seem probable. Children have come into the world without an esophagus, or any communication between the stomach and the mouth; but there has been no well at the birth of a child's having been born without a placenta; and it does not seem likely, that any of the fluid can be absorbed through the pores of the skin, the skin in the fetus being every where covered with a great quantity of mucus.
Part III.

Anatomy.

Of the branches of the umbilical vein. So that the blood is constantly passing in at one side of the placenta and out at the other; but in what particular manner it gets through, the placenta is a point not yet determined.

Explanation of Plates XXV. XXVI. and XXVII.

Plate XXV.

Fig. 1. Shows the Contents of the Thorax and Abdomen in situ.

1. Top of the trachea, or wind-pipe. 2. Internal jugular veins. 33. Subclavian veins. 4. The aorta. 5. The right auricle of the heart. 6. The right ventricle. 7. Part of the left ventricle. 8. The aorta. 9. The pulmonary artery. 10. The lung, part of which is cut off to show the great blood vessels. 11. The left lung entire. 12. The anterior edge of the diaphragm. 13. The two great lobes of the liver. 14. The ligamentum rotundum. 15. The gall-bladder. 16. The stomach. 17. The jejunum and ileum. 18. The spleen.

Fig. 2. Shows the Organs subervient to the Chylolymphatic Viscera, with those of Urine and Generation.

1, The under side of the two great lobes of the liver. 2, Lobulus Spigelii. 3. The ligamentum rotundum. 4. The gall-bladder. 5. The spleen. 6, The kidneys. 7. The aorta. 8. Vena cava ascendens. 9. The renal veins covering the arteries. 10. A probe under the spermatic vessels and a bit of the inferior mesentric artery, and over the ureters. 11. The ureters. 12. The iliac arteries and veins. 13. The vena cava inferiores. 14. The bladder of urine.

Fig. 3. Shows the Chylolymphatic Viscera, and Organs subervient to them, taken out of the Body entire.


Fig. 4. Shows the Heart of a Foetus at the full term, with the Right Auricle cut open to show the Foramen Ovale, or passage between both Auricles.

a, The right ventricle. b, The left ventricle. c c, The outer side of the right auricle stretched out.

d d, The posterior side, which forms the anterior side of the septum. e, The foramen ovale, with the membrane or valve which covers the left side. f, Vena cava inferior passing through g, A portion of the diaphragm.

Fig. 5. Shows the Heart and Large Vessels of a Foetus at the full time.

a, The left ventricle. b, The right ventricle. c, A part of the right auricle. d, Left auricle. e e, The right branch of the pulmonary artery. f, Arteria pulmonalis. g g, The left branch of the pulmonary artery, with a number of its largest branches dissected from the lungs. h, The canalis arteriosus. i, The arch of the aorta. k k, The aorta descendens. l, The left subclavian artery. m m, The left carotid artery. n, The right carotid artery. o, The right subclavian artery. p, The origin of the right carotid and right subclavian arteries in one common trunk. q, The vena cava superior or descendens. r, The right common subclavian vein. s, The left common subclavian vein.

N. B. All the parts described in this figure are to be found in the adult, except the canalis arteriosus.

Plate XXVI.

Fig. 1. Exhibits the more superficial Lymphatic Vessels of the Lower Extremity.

A, The spine of the os ilium. B, The os pubis. C, The iliac artery. D, The knee. E E, F, Branches of the crural artery. G, The musculus gastrocnemius. H, The tibia. I, The tendon of the musculus tibialis anticus. On the outlines, s, A lymphatic vessel belonging to the top of the foot. b, Its first division into branches. c, c, c, Other divisions of the same lymphatic vessel. d, A small lymphatic gland. e, The lymphatic vessels which lie between the skin and the muscles of the thigh. f f, Two lymphatic glands at the upper part of the thigh below the groin. g, g, g, Other glands. h, A lymphatic vessel which passes by the side of those glands without communicating with them; and, bending towards the inside of the groin at (i), opens into the lymphatic gland (k). I I, Lymphatic glands in the groin, which are common to the lymphatic vessels of the genitals and those of the lower extremity. m, n, A plexus of lymphatic vessels passing on the inside of the iliac artery.

Fig. 2. Exhibits a Back View of the Lower Extremity, dissected so as to show the deeper-seated Lymphatic Vessels which accompany the Arteries.

A, the os pubis. B, The tuberosity of the ilium. C, That part of the os ilium which was articulated with the os sacrum. D, The extremity of the iliac artery appearing above the groin. E, The knee. F F, The two cut surfaces of the triceps muscle, which was divided to show the lymphatic vessels that pass through its perforation along with the crural artery. G, The edge of the musculus gracilis. H, The gastrocnemius and soleus, much shrunk by being dried, and by the soleus being separated from the
Abdomen; fole of the foot. L, The superficial lymphatic or... palling over the tibia to explore the groin, into which lymphatic glands. H, The body of the abdomen. D, The spermatic vessels... the large lymphatics. 11, The thoracic duct penetrating the thorax. 2, Some lymphatic vessels joining that duct in the thorax. 3, The thoracic duct paling under the curvature of the aorta to get to the left subclavian vein. The aorta being drawn aside to show the duct. r, A plexus of lymphatic vessels paling upon the trachea from the thyroid gland to the thoracic duct.

**FIG. 1.** Represents the Under and Posterior Side of the Bladder of Urine, &c.

a, The bladder, b b, The infection of the urters. c c, The vasa deferentia, which convey the semen from the testicles to d d, The vesiculae femininae,—and pass through e, The prostate gland, to discharge themselves into f, The beginning of the urethra.

**FIG. 2.** A tranverse Section of the Penis. g g, Corpora cavernosa penis. h, Corpus cavernosum urethrae. i, Urethra. k, Spermum penis. 1, The septum between the corpus cavernosum urethrae and that of the penis.

**FIG. 3.** Exhibits the Trunk of the Human Subject, prepared to show the Lymphatic Vessels and the Ductus Thoracicus. A A, The neck. B B, The two jugular veins. C, The vena cava superior. D D D D, The subclavian veins. E, The beginning of the aorta, pulled to the left side by means of a ligature, in order to show the thoracic duct behind it. F, The branches arising from the curvature of the aorta. G G, The two carotid arteries. H H, The first ribs, I I, The trachea. K K, The spine. L L, The vena azygos M M, The descending aorta. N, The caecial artery, dividing into three branches. O, The superior mesenteric artery. P, The right crural artery. Q Q, The two kidneys. R, The right emulent artery. S S, The external iliac arteries. g d, The musculi plantarum. T, The internal iliac artery. U, The cavity of the pelvis. X X, The spine of the os ilium. Y Y, The groins. a, A lymphatic gland in the groin, into which lymphatic vessels from the lower extremity are seen to enter. b b, The lymphatic vessels of the lower extremities passing under Poupart’s ligament. c c, A plexus of the lymphatic vessels lying on each side of the pelvis. d d, The pia mater with lymphatic vessels lying upon its inside. e e, A plexus of lymphatics, which having passed over the brim of the pelvis at (e), having entered the cavity of the pelvis, and received the lymphatic vessels belonging to the vasa contained in that cavity, next ascends, and palls behind the iliac artery to (g). f f, Some lymphatic vessels of the left side passing over the upper part of the os sacrum, to meet those of the right side. g g, The right pia mater, with a large plexus of lymphatics lying on its inside. h h, The plexus lying on each side of the spine. i i, Spaces occupied by the lymphatic glands. k k, The trunk of the last two, lying on the under side of the superior mesenteric artery. l l, The iliac artery dividing into two branches, one of which passes on each side of the aorta; that of the right side being seen to enter the thoracic duct at (m). m m, The thoracic duct beginning from the large lymphatics. n n, The duct passing under the lower part of the crus diaphragmaticus, and under the right emulent artery. o o, The thoracic duct penetrating the thorax. p p, Some lymphatic vessels joining that duct in the thorax. q q, The thoracic duct paling under the curvature of the aorta to get to the left subclavian vein. The aorta being drawn aside to show the duct. r r, A plexus of lymphatic vessels paling upon the trachea from the thyroid gland to the thoracic duct.

**PLATE XXVII.**

**FIG. 4.** Represents the Female Organs of Generation.
a, That side of the uterus which is next the os faucium. 1, Its fundus. 2, Its cervix. b b, The Fallopian or uterine tubes, which open into the cavity of the uterus;—but the other end is open within the pelvis, and surrounded by c c, The fimbriae. d d, The ovaria. e e, The os internum uteri, or mouth of the womb. f f, The ligamenta rotunda, which palls without the belly, and is fixed to the labia pudendi. g g, The cut edges of the ligamenta lata, which connects the uterus to the pelvis. h h, The inside of the vagina. i i, The orifice of the urethra. k k, The clitoris surrounded by (l l) The preputium. m m, The labia pudendi. n n, The nymphae.

**FIG. 5.** Shows the Spermatic Ducts of the Testicle filled with Mercury.

A, The vas deferens. B, Its beginning, which forms the posterior part of the epididymis. C, The middle of the epididymis, composed of serpentine ducts. D, The head or anterior part of the epididymis unravelled. e e e e, The whole ducts which compose the head of the epididymis unravelled. f f, The vasa deferentia. g g, Rete testis. h h, Some rectilinear ducts which send off the vasa deferentia. i i, The substance of the testicle.

**FIG. 6.** The right Testicle entire, and the Epididymis filled with Mercury.


**PART III.**
THE thorax, or chest, is that cavity of the trunk which extends from the clavicles, or the lower part of the neck, to the diaphragm, and includes the vital organs, which are the heart and lungs; and likewise the trachea and oesophagus. This cavity is formed by the ribs and vertebrae of the back, covered by a great number of muscles, and by the common integuments, and anteriorly by two glandular bodies called the breasts. The spaces between the ribs are filled up by muscular fibres, which from their situation are called intercostal muscles.

Sect. I. Of the Breasts.

The breasts may be defined to be two large conglomerate glands, mixed with a good deal of adipose membrane. The glandular part is composed of an infinite number of minute arteries, veins, and nerves.

The arteries are derived from two different trunks; one of which is called the internal, and the other the external mammary artery. The first of these arteries, from the subclavian, and the latter from the axillary.

The veins every where accompany the arteries, and are distinguished by the same name. The nerves are chiefly from the vertebral pairs. Like all other conglomerate glands, the breasts are made up of a great many small distinct glands, in which the milk is secreted from the ultimate branches of arteries. The excretory ducts of these several glands gradually uniting as they approach the nipple, from the tubuli lacticiferi, which are usually more than a dozen in number, and open at its apex, but have little or no communication, as has been supposed, at the root of the nipple. These ducts, in their course from the glands, are surrounded by a ligamentary elastic fibulature, which terminates with them in the nipple. Both this fibulature, and the ducts which it contains, are capable of considerable extension and contraction; but in their natural state are moderately corrugated, so as to prevent an involuntary flow of milk, unless the deftending force be very great from the accumulation of too great a quantity.

The whole substance of the nipple is very spongy and elastic: its external surface is uneven, and full of small tubercles. The nipple is surrounded with a disc or circle of a different colour, called the areola; and on the inside of the skin, under the areola, are many sebaceous glands, which pour out a mucous to defend the areola and nipple: for the skin upon these parts is very thin; and the nervous papillæ lying very bare, are much exposed to irritation.

The breasts are formed for the secretion of milk, which is destined for the nourishment of the child for some time after its birth. This secretion begins to take place soon after the delivery, and continues to flow for many months in very large quantities, if the woman suckles her child.

The operation of suction depends on the principles of the air-pump, and the flow of milk through the lactiferous tubes is facilitated by their being stretched out.

The milk, examined chemically, appears to be composed of oil, mucilage, and water, and of a considerable quantity of sugar. The generality of physiologists have supposed that, like the chyle, it frequently retains the properties of the aliment and medicines taken into the stomach; but from some late experiments, this supposition appears to be ill-founded.

Sect. II. Of the Pleura.

The cavity of the thorax is every where lined by a membrane of a firm texture called pleura. It is composed of two distinct portions or bags, which, by being applied to each other laterally, form a septum called mediastinum; which divides the cavity into two parts, and is attached posteriory to the vertebrae of the back, and anteriorly to the sternum. But the two laminae of which this septum is formed, do not every where adhere to each other; for at the lower part of the thorax they are separated, to afford a lodgement to the heart; and at the upper part of the cavity, they receive between them the thymus.

The pleura is plentifully supplied with arteries and veins from the internal mammary and the intercostals. Its nerves, which are very inconsiderable, are derived chiefly from the dorsal and intercostal nerves.

The surface of the pleura, like that of the peritoneum and other membranes lining cavities, is constantly bedewed with a serous moisture (w) which prevents adhesion of the visceræ.

The mediastinum, by dividing the breast into two cavities, obviates many inconveniences, to which we should otherwise be liable. It prevents the two lobes of the lungs from compressing each other when we lie on one side; and consequently contributes to the freedom of respiration, which is disturbed by the least pressure on the lungs. If the point of a sword penetrates between the ribs into the cavity of the thorax, the lungs on that side cease to perform their office; because the air being admitted through the wound, prevents the dilatation of that lobe; while the other lobe, which is separated from it by the mediastinum, remains unhurt, and continues to perform its function as usual.

Sect. III. Of the Thymus.

The thymus is a glandular substance, the use of which is not perfectly ascertained, its excretory duct not having yet been discovered. It is of an oblong shape.

(w) When this fluid is exhaled in too great a quantity, or is not properly carried off, it accumulates and constitutes the hydrops pectoris.
ANATOMY.

Part IV.

Sect. V. Of the Trachea.

The trachea or windpipe, is a cartilaginous and membranous canal, through which the air paffes into the lungs. Its upper part, which is called the larynx, is composed of five cartilages. The uppermost of these cartilages is placed over the glottis or mouth of the larynx, and is called epiglottis, which has been before spoken of, as closing the passage to the lungs in the act of swallowing. At the sides of the glottis are placed the two arytenoide cartilages, which are of a very complex figure, not easy to be described. The anterior and larger part of the larynx is made up of two cartilages: one of which is called thyroides or stenophysis, from its being shaped like a buckler; and the other ericoides or annularis, from its resembling a ring. Both these cartilages may be felt immediately under the skin, at the fore part of the throat, and the thyroids, by its convexity, forms an eminence called pomum adam, which is usually more considerable in the male than in the female subject.

All these cartilages are united to each other by means of very elastic, ligamentous fibres; and are enabled, by the assistance of their several muscles, to dilate or contract the passage of the larynx, and to perform that variety of motion which seems to point out the larynx as the principal organ of the voice; for when the air paffes out through a wound in the trachea, it produces no sound.

These cartilages are moistened by a mucus, which seems to be secreted by minute glands situated near them. The upper part of the trachea is covered anteriorly and laterally by a considerable body, which is supposed to be of a glandular structure, and from its situation near the thyroid cartilage is called the thyroid gland; though its excretory duct has not yet been discovered, or its real use ascertained.

The glottis is interiorly covered by a very fine membrane, which is moistened by a conflant supply of a watery fluid. From the larynx the canal begins to take the name of trachea or affera arteria, and extends from thence as far down as the third or fourth vertebra of the back, where it divides into two branches, which are the right and left bronchial tube. Each of these bronchi (v) ramifies through the substance of that lobe of the lungs to which it is distributed, by an infinite number of branches, which are formed of cartilages separated from each other like those of the trachea, by an intervening membranous and ligamentary substance. Each of these cartilages is of an angular figure; and as they become gradually less and less in their diameter, the lower ones in some measure received into those above them, when the lungs, after being inflated, gradually collapse by the air being pulsed

(x) Anatomical writers have usually described the diaphragm as being made up of two muscles united by a middle tendon; and these two portions or crura form what they speak of as the inferior muscul, arising from the fides and fore part of the vertebra.

(v) The right bronchial tube is usually found to be somewhat shorter and thicker than the left; and M. Portal, who has published a memoir on the action of the lungs on the aorta in respiration, observes, that the left bronchial tube is closely connected by the aorta; and from some experiments he is induced to conclude, that in the first respirations, the air only enters into the right lobe of the lungs. *Memoires de l' Academie Royale des Sciences, 1769.*
Of the Thorax.

Part IV. ANATOMY.

Thorax. ed out from them in expiration. As the branches of the bronchi become more minute, their cartilages become more and more angular and membranous, till at length they are found to be perfectly membranous, and at last become invisible.

The trachea is furnished with fleshy or muscular fibres; some of which pass through its whole extent longitudinally, while the others are carried round it in a circular direction; so that by the contraction or relaxation of these fibres, it is enabled to shorten or lengthen itself, and likewise to dilate or contract the diameter of its passage.

The trachea and its branches, in all their ramifications, are furnished with a great number of small glands which are lodged in their cellular substance, and discharge a mucous fluid on the inner surface of these tubes.

The cartilages of the trachea, by keeping it constantly open, afford a free passage to the air, which we are obliged to inceasingly respire; and its membranous part, by being capable of instantly open, are obliged to be greater or less quantity, and with more or less velocity, as may be required in singing or in declamation. This membranous structure of the trachea posteriorly, seems likewise to assist in the digest of the food, by preventing that impediment to its passage down the oesophagus, which might be expected if the cartilages were complete rings.

The trachea receives its arteries from the carotid and subclavian arteries, and its veins pass into the jugulars. Its nerves arise from the recurrent branch of the eighth pair, and from the cervical plexus.

Sect. VI. Of the Lungs.

The lungs fill the greater part of the cavity of the breast. They are of a soft and fpongy texture, and are divided into two lobes, which are separated from each other by the mediastinum, and are externally covered by a production of the pleura. Each of these is divided into two or three lesser lobes; and we commonly find three in the right side of the cavity, and two in the left.

To discover the structure of the lungs, it is required to follow the ramifications of the bronchi, which were described in the last section. These becoming gradually more and more minute, at length terminate in the cellular spaces or vesicles, which make up the greatest part of the substance of the lungs, and readily communicate with each other.

The lungs seem to possess but little sensibility. Their nerves, which are small, and few in number, are derived from the intercostal and eighth pair. This last pair having reached the thorax, sends off a branch on each side of the trachea, called the recurrent, which reconstitutes the back of the trachea, to which it furnishes branches in its ascent, as well as to the oesophagus, but it is chiefly distributed to the larynx and its mucous. By dividing the recurrent and superior laryngeal nerves at their origin, an animal is deprived of its voice.

There are two series of arteries which carry blood to the lungs: these are the arterial bronchial, and the pulmonary artery.

The arterial bronchial branches begin usually by two branch-
blood, the pulmonary artery begins again to be distended, the stimulus is renewed, and the same progress is repeated, and continues to be repeated, in a regular succession, during life: for though the muscles of respiration, having a mixed motion, are (unlike the heart) in some measure dependent on the will, yet no human being, after having once expired, can live many moments without it. In an attempt to hold one's breath, the blood soon begins to distend the veins, which are unable to empty their contents into the heart; and we are able only, during a very little time, to resist the stimulus to inspiration. In drowning, the circulation seems to be stopped upon this principle: and in hanging, the pressure made on the jugular veins, may cooperate with the stoppage of respiration in bringing on death.

Till within these few years physiologists were entirely ignorant of the use of respiration. It was at length discovered in part by the illustrious Dr Priei'sley. He found that the air expired by animals was phlogisticated; and that the air was fitted for respiration, or for supporting animal life, in proportion as it was free from the phlogistic principle. It had long been observed, that the blood in passing through the lungs acquired a more florid colour. He therefore suspected, that it was owing to its having imparted phlogiston to the air: and he satisfied himself of the truth of this idea by experiments, which showed, that the cistern of extravasated blood, phlogisticated air in proportion as it left its dark colour. He farther found, that blood thus reddened had a strong attraction for phlogiston; insomuch that it was capable of taking it from phlogisticated air, thereby becoming of a darker colour.

From hence it appeared that the blood, in its circulation through the arterial vessels, imbibes a considerable quantity of phlogiston, which is discharged from it to the air in the lungs.

This discovery has since been prosecuted by two very ingenious physiologists, Dr Crawford and Mr Elliot. It has been shown by professors Black and Irvine, that different bodies have different capacities for containing fire. For example, that oil and water, when equally hot to the fene and the thermometer, contain different proportions of that principle; and that unequal quantities of it are required, in order to raise those substances to like temperatures. The enquiries of Dr Crawford and Mr Elliot tend to prove, that the capacities of bodies for containing fire are diminished by the addition of phlogiston, and increased by its separation: the capacity of calx of antimony, for example, being greater than that of the antimony itself. Common air contains a great quantity of fire; combustible bodies very little. In combustion, a double elective attraction takes place: the phlogiston of the body being transferred to the air, the fire contained in the air to the combustible body. But as the capacity of the latter is not increased so much as that of the former is diminished, only part of the extricated fire will be absorbed by the body. The remainder therefore will raise the temperature of the compound; and hence we may account for the heat attending combustion. As the use of respiration is to dephlogisticate the blood, it seems probable, that a like double elective attraction takes place in this process; the phlogiston of the blood being transferred to the air, and the fire contained in the air to the blood; but with this difference, that the capacities being equal, the whole of the extricated fire is absorbed by the latter. The blood in this state circulating through the body, imbibes phlogiston, and of course gives out its fire; part only of which is absorbed by the parts furnishing the phlogiston, the remainder, as in combustion, becoming sensible; and is therefore the cause of the heat of the body, or what is called animal heat.

In confirmation of this doctrine it may be observed, that the venous blood contains less fire than the arterial; combustible bodies less than incombustible ones; and that air contains less of this principle, according as it is rendered, by combination with phlogiston, less fit for respiration (z).

In ascending very high mountains, respiration is found to become short and frequent, and sometimes to be attended with a spitting of blood. These symptoms seem to be occasioned by the air being too rare and thin to dilate the lungs sufficiently; and the blood gradually accumulating in the pulmonary vessels, sometimes bursts through their coats, and is brought up by coughing. This has likewise been accounted for in a different way, by supposing that the air contained in the blood, not receiving an equal pressure from that of the atmosphere, expands, and at length ruptures the very minute branches of the pulmonary vessels; upon the same principle that fruits and animals put under the receiver of an air-pump, are seen to swell as the outer air becomes exhausted. But Dr Darwin of Litchfield has lately published some experiments, which seem to prove, that no air or elastic vapour does exist in the blood-vessels, as has been generally supposed; and he is induced to impute the spitting of blood, which has sometimes taken place in ascending high mountains, to accident, or to violent exertions: as it never happens to animals that are put into the exhausted receiver of an air-pump, where the diminution of pressure increases in every rising lights greater than on the summit of the highest mountains.

Sect. VIII. Of the Voice.

Respiration has already been described as affording us many advantages; and next to that of life, its most important use seems to be that of forming the voice and speech. The ancients, and almost all the moderns, have considered the organ of speech as a kind of musical instrument, which may be compared to a flute, to an hautboy, to an organ, &c. and they argue after the following manner.

The trachea, which begins at the root of the tongue, and goes to terminate in the lungs, may be compared to the pipe of an organ, the lungs dilating like bellows during the time of inspiration; and as the air is driven out from them in expiration, it finds its passage striated by the cartilages of the larynx, against which it strikes.

(z) See Crawford's Experiments and Observations on Animal Heat, and Elliot's Philosophical observations.
Part IV. ANATOMY.

Of the Thorax.

Strikes. As these cartilages are more or less elastic, they occasion in their turn more or less vibration in the air, and thus produce the sound of the voice; the variation in the found and tone of which depends on the state of the glottis, which, when strained, produces an acute tone, and a grave one when dilated.

The late M. Ferein communicated to the French Academy of Sciences a very ingenious theory on the formation of the voice. He considered the organ of the voice as a fpring, as well as a wind, instrument; so that what art has hitherto been unable to construct, and what both the fathers Mersenne and Kircher, so much wished to see, M. Ferein imagined he had at length discovered in the human body. He observes, that there are at the edges of the glottis certain tendinous chords, placed horizontally across it, which are capable of considerable vibration, so as to produce sound, in the same manner as it is produced by the strings of a violin or a harp-chord; and he supposes that the air, as it passes out from the lungs, acts as a bow on these strings, while the efforts of the breast and lungs regulate its motion, and produce the variety of tones. So that according to this system the variation in the voice is not occasioned by the dilatation or contraction of the glottis, but by the diffusion or relaxation of these strings, the found being more or less acute in proportion as they are more or less stretched out. Another writer on this subject supposes, that the organ of voice is a double instrument, which produces in unison two sounds of a different nature; one by means of the air, and the other by means of the chords of the glottis. Neither of these systems, however, are universally adopted. They are both liable to insuperable difficulties; so that the manner in which the voice is formed has never yet been satisfactorily ascertained: we may observe, however, that the sound produced by the glottis is not articulate. To effect this, it is required to pass through the mouth, where it is differently modified by the action of the tongue, which is either pushed against the teeth, or upwards towards the palate; detaining it in its passage, or permitting it to flow freely, by contracting or dilating the mouth.

Sect. IX. Of Dejection.

By dejection we mean the act of voiding the faces at the anus; and an account of the manner in which this is conducted was reserved for this part of the work, because it seemed to require a knowledge of respiration to be perfectly understood.

The intestines were described as having a peristaltic motion, by which the faces are gradually advancing towards the anus. Now, whenever the faces are accumulated in the intestinum rectum in a sufficient quantity to become troublesome, either by their weight or acrimony, they excite a certain uneasiness which induces us to go to stool. To effect this, we begin by making a considerable inspiration; in consequence of which the diaphragm is carried downwards towards the lower belly; the abdominal muscles are at the same time contracted in obedience to the will; and the intestines being compressed on all sides, the resistance of the sphincter is overcome, and the faces pass out at the anus; which is afterwards drawn up by its longitudinal fibres, which are called levator ani, and then by means of its sphincter is again contracted; but it sometimes happens, as in dysenteries for instance, that the faces are very liquid, and have considerable acrimony; and then the irritation they occasion is more frequent, so as to promote their discharge without any pressure from the diaphragm or abdominal muscles; and sometimes involuntarily, as is the case when the sphincter becomes paralytic.

Sect. X. Of the Pericardium, and of the Heart and its Auricles.

The two membranous bags of the pleura, which were described as forming the mediastinum, recede one from the other, so as to afford a lodgement to a firm membranous fasciculus, in which the heart is securely lodged; this fasciculus, which is the pericardium, appears to be composed of two tunics, united to each other by cellular membrane. The outer coat, which is thick, and in some places of a tendinous complexion, is a production of the mediastinum; the inner coat, which is extremely thin, is reflected over the auricles and ventricles of the heart, in the same manner as the tunica conjunctiva, after lining the eye lids, is reflected over the eye. This bag adheres to the tendinous part of the diaphragm, and contains a coagulable lymph, the liquor pericardii, which serves to lubricate the heart and facilitate its motions; and seems to be secreted and absorbed in the same manner as it is in the other cavities of the body.

The arteries of the pericardium are derived from the phrenic, and its veins pass into veins of the same name; its nerves are likewise branches of the phrenic. The size of the pericardium is adapted to that of the heart, being usually large enough to contain it loosely. As its cavity does not extend to the sternum, the lungs cover it in inspiration; and as it everywhere invests the heart, it effectually secures it from being injured by lymph, pus, or any other fluid, extravasated into the cavities of the thorax.

The heart includes two cavities or ventricles, which are separated from each other by a fibrous septum: one of these is called the right, and the other the left ventricle; though perhaps, with respect to their situation, it would be more proper to distinguish them into the anteriour and posterior ventricles.

The heart is externally covered by a very fine membrane; and its structure is perfectly muscular or fibrous, being composed of fibres which are described as passing in different directions; some as being extended longitudinally from the basis to the apex; others, as taking an oblique or spiral course; and a third sort as being
ANATOMY.

Of the Thorax.

258

being placed in a transverse direction (a).—Within the two ventricles we observe several furrows; and there are likewise tendinous sinuses, which arise from fibrous columns in the two cavities, and are attached to the valves of the auricles: That the use of these and the other valves of the heart may be understood, it must be observed, that four large vessels pass out from the bases of the heart, viz. two arteries and two veins; and that each of these vessels is furnished with a thin membranous production, which is attached all round to the borders of their several orifices, from whence hanging loosely down they appear to be divided into two or three smaller portions. But as the valves in the arteries and veins are different, so are they differently disposed. Those of the arteries are intended to give way to the passage of the blood into them from the ventricles, but to oppose its return: and, on the contrary, the valves of the veins are constructed so as to allow the blood only to pass into the heart. In consequence of these different uses, we find the valves of the pulmonary artery and of the aorta attached to the orifices of those vessels, so as to have their concave surfaces turned towards the artery: and their convex surfaces, which mutually meet together, being placed towards the ventricle, only permit the blood to pass one way, which is into the arteries. There are usually three of these valves belonging to the pulmonary artery, and as many to the aorta; and from their figure they are called valvulae semilunares. The communication between the two great veins and the ventricles is by means of the two appendages or auricles into which the blood is discharged; so that the other valves which may be said to belong to the veins, are placed in each ventricle, and correspond with the cavities. But as the valves in the right ventricle are usually three in number, and are named valvulae tricuspidae; but in the left ventricle we commonly observe only two, and these are the valvulae mitrales. The membranes which form these valves in each cavity are attached so as to project somewhat forward; and both the tricuspidae and the mitrales are connected with the tendinous sinuses, which were described as arising from the fibrous columns. By the contraction of either ventricle, the blood is driven into the artery which communicates with that ventricle; and the tendinous sinuses being gradually relaxed as the sides of the cavity are brought nearer to each other, the valves naturally close the opening into the auricle, and the blood necessarily directs its course into the then only open passage, which is into the artery; but after this contraction, the heart becomes relaxed, the tendinous sinuses are again stretched out, and, drawing the valves of the auricle downwards, the blood is poured by the veins into the ventricle, from whence, by another contraction, it is again thrown into the artery, as will be described hereafter. The right ventricle is not quite so long, though somewhat larger, than the left; but the latter has more substance than the other: and this seems to be, because it is intended to transmit the blood to the most distant parts of the body; whereas the right ventricle distributes it only to the lungs.

The heart receives its nerves from the par vagum and the intercostals. The arteries which serve for its nourishment are two in number, and arise from the aorta. They surround in some measure the basis of the heart, and from this course are called the coronary arteries. From these arteries the blood is returned by veins of the same name into the auricles, and even into the ventricles.

The muscular bags called the auricles are situated at the basis of the heart, at the sides of each other; and correspond with the auricles, are like those two cavities distinguished into right and left. These faces, which are internally unequal, have externally a jagged appendix; which, from its having been compared to the extremity of an ear, has given them their name of auricles.

Sect. XI. Angiology, or a Description of the Blood-vessels.

The heart has been described as contracting itself, and throwing the blood from its two ventricles into the pulmonary artery and the aorta, and then as relaxing itself and receiving a fresh supply from two large veins, which are the pulmonary vein and the venae cavae. We shall now point out the principal distributions of these vessels.

The pulmonary artery arises from the right ventricle by a large trunk, which soon divides into two considerable branches, which pass to the right and left lobes of the lungs: each of these branches is afterwards subdivided into an infinite number of branches and ramifications, which extend throughout the whole substance of the lungs; and from these branches the blood is returned by the veins, which, contrariwise to the course of the arteries, begin by very minute canals, and gradually become larger, forming at length four large trunks called pulmonary veins, which terminate in the left auricle by one common opening, from whence the blood passes into the left ventricle. From this same ventricle raises the aorta or great artery, which at its beginning is nearly an inch in diameter: it soon sends off two branches, the coronaries, which go to be distributed to the heart and its auricles. After this, at or about the third or fourth vertebra of the back, it makes a considerable curvature; from this curvature (n) arise three arteries; one of which soon divides into two branches. The first two are the left subclavian and the left carotid, and the third is a common trunk to the right subclavian and right carotid; though sometimes both the carotids arise distinctly from the aorta.

The two carotida ascend within the subclavians, along the sides of the trachea; and when they have reached the larynx, divide into two principal branches, the internal and external carotid. The first of these runs a little

(a) Authors differ about the course and distinctions of these fibres; and it seems right to observe, that the structure of the heart being more complex than that of other muscles, its fibres are not easily separated.

(b) Anatomists usually call the upper part of this curve aorta ascendens; and the other part of the artery to its division at the iliacs, aorta descendens; but they differ about the place where this distinction is to be introduced; and it seems sufficiently to answer every purpose, to speak only of the aorta and its curvature.
little way backwards in a bending direction; and hav­
ing reached the under part of the ear, passes through the
canal into the os petrosum, and entering into the

cavity of the cranium, is distributed to the brain and the

membranes which envelop it, and likewise to the
eye. The external carotid divides into several branches,

which are distributed to the larynx, pharynx, and other

parts of the neck; and to the jaws, lips, tongue,

eyes, temples, and all the external parts of the head.

Each subclavian is likewise divided into a great

number of branches. It sends off the vertebral artery,

which passes through the openings we see at the bot­
tom of the transverse processes of the vertebrae of the

neck, and in its course sends off many ramifications to

the neighbouring parts. Some of its branches are
distributed to the spinal marrow, and after a considera­
able infection it enters into the cranium, and is dis­
tributed to the brain. The subclavian likewise sends
off branches to the muscles of the neck and scapula;

and the mediafunium, thymus, pericardium, diaphragm,

the breasts, and the muscles of the thorax, and even

even of the abdomen, derive branches from the subclavian,

which are distinguished by different names, alluding to

the parts to which they are distributed; as the mam­
nary, the phrenic, the intercostal, &c. But notwith­
standing the great number of branches which have

been described as arising from the subclavian, it is still

a considerable artery when it reaches the axilla, where

it drops its former name, which alludes to its

position under the clavicle, and is called the axillary artery; 

from which a variety of branches are distributed to the

muscles of the breast, scapula, and arm.—But its main

trunk taking the name of brachialis, runs along on the in­
side of the arm near the os humeri, till it reaches the joint

of the fore-arm, and then it divides into two branches.

This division however is different in different subjects;

for in some it takes place higher up and in others lower

down. When it happens to divide above the joint, it

may be considered as a happy disposition in case of

an accident by bleeding; for supposing the artery to

be unfortunately punctured by the lancet, and that the

haemorrhage could only be stopped by making a liga­
ture on the vessel, one branch would remain unhurt,

through which the blood would pass uninterrupted to the

fore-arm and hand. One of the two branches of the

brachialis plunges down under the flexor muscles, and

runs along the edge of the ulna; while the other

is carried along the outer surface of the radius, and is

easily felt at the wrist, where it is only covered by the

common integuments. Both these branches commonly

unite in the palm of the hand, and form an arterial arch

from whence branches are detached to the fin­
gers.

The aorta, after having given off at its curvature the
carotids and subclavians which convey blood to all the
upper parts of the body, descends upon the bodies of the
vertebrae a little to the left, as far as the os facrum,

where it drops the name of aorta, and divides into
two considerable branches. In this course, from its

curvature to its bifurcation, it sends off several arteries

in the following order: 1. One or two little arteries,

first demonstrated by Ruych as going to the branchi,

and called arteria branchiales Ruyfchi. 2. The arteriae

of the pharynx. These are commonly three or four in num-

ber. They arise from the fore-part of the aorta, and

are distributed chiefly to the oesophagus. 3. The

inferior intercostal arteries, which are distributed be­

tween the ribs in the same manner as the arteries of the

three or four superior ribs are, which are derived

from the subclavian. These arteries send off branches
to the mediulla spinalis. 4. The pharyngeal or in­

ferior phrenic arteries, which go to the diaphragm,

omum, duodenum, pancreas, spleen, liver, and gall-bladder.

5. The celiac, which sends off the coronary-biache, the splenic, and the hepatic artery. 6. The superior mesenteric artery,

which is distributed to the mesentery and small intestines. 7. The emulgents, which go to the kidneys. 8. The

arteries, which are distributed to the glandular renales. 

9. The spermatic. 10. The inferior mesenteric artery,

which ramifies through the lower portion of the

mesentery and the large intestines.—A branch of this

artery which goes to the rectum is called the internal

hemorrhoidal. 11. The lumbar arteries, and a very

small branch called the sura, which are distributed to

the muscles of the loins and abdomen, and to the os

crucem and medulla spinalis.

The trunk of the aorta, when it has reached the

last vertebra lumbarum, or the os facrum, drops the

name of aorta, and separates into two forked branches
called the iliacs. Each of these soon divides into two

branches; one of which is called the internal iliac; or

hypogastric artery, and is distributed upon the contents

of the pelvis and upon the muscles on its outer side.

One branch, called pudenda communis, sends small ra­
mifications to the end of the rectum under the name of

hemorrhoidales externes, and is afterwards distributed

upon the penis. The other branch, the external iliac,

after having given off the circumflex artery of the os

ilium and the epigastric, which is distributed to the

recti-muscles, passes out of the abdomen under Poupart's

ligament, and takes the name of crural artery. It de­

scends on the inner part of the thigh close to the os

femoris, sending off branches to the muscles, and then

mingling deeper in the hind part of the thigh, reaches

the hain, where it takes the name of popliteal: after

this it separates into two considerable branches; one of

which is called the anterior tibial artery; the other di­

vides into two branches, and these arteries all go to be

distributed to the leg and foot.

The blood, which is thus distributed by the aorta to

all parts of the body, is brought back by the veins,

which are supposed to be continued from the ultimate

branches of arteries; and uniting together as they ap­

proach the heart, at length form the large trunks, the

vena cava ascends, and vena cava descends.

All the veins which bring back the blood from the

upper extremities, and from the head and breast, pas­
s into the vena cava descends; and those which return

it from the lower parts of the body terminate in the

vena cava ascends; and these two veins uniting to­
gether as they approach the heart, open by one com­

mon orifice into the left auricle.

It does not here seem to be necessary to follow the

different divisions of the veins as we did those of the

arteries; and it will be sufficient to remark, that in

genemical every artery is accompanied by its vein, and

that both are distinguished by the same name. But,
Of the Thorax:

Like many other general rules, this too has its exceptions (c). The veins, for instance, which accompany the external and internal carotid, are not called the carotid veins, but the external and internal jugular.

In the thorax, there is a vein distinguished by a proper name, and this is the azygos, or vein sine pari. This vein, which is a pretty considerable one, runs along by the right side of the vertebræ of the back, and is chiefly destined to receive the blood from the intercostal on that side, and from the lower half of those on the left side, and to convey it into the vena cava descendens. In the abdomen we meet with a vein, which is still a more remarkable one, and this is the vena portæ, which performs the office both of an artery and a vein. It is formed by a re-union of all the veins which come from the liver, intestines, stomach, liver, pancreas, spleen, so as to compose one great trunk, which goes to ramify through the liver; and after having deposited the bile, its ramifications unite and bring back into the vena cava, not only the blood which the vena portæ had carried into the liver, but likewise the blood from the hepatic artery. Every artery has a vein which corresponds with it; but the trunks and branches of the veins are more numerous than those of the arteries. The reasons for this disposition are perhaps more difficult to be explained; the blood in its course through the veins is much farther removed from the source and cause of its motion, which are in the heart, than it was when in the arteries; so that its course is consequently less rapid, and enough of it could not possibly be brought back to the heart in the moment of its dilatation, to equal the quantity which is driven into the arteries from the two ventricles, at the time they contract; and the equilibrium which is so essential to the continuance of life and health would consequently be destroyed, if the capacity of the veins did not exceed that of the arteries, in the same proportion that the rapidity of the blood’s motion through the arteries exceeds that of its return through the veins.

A large artery ramifying through the body, and continued to the minute branches of veins, which gradually unite together to form a large trunk, may be compared to two trees united to each other at their tops; or rather as having their ramifications so divided that the two trunks terminate in one common point; and if we farther suppose, that both these trunks and their branches are hollow, and that a fluid is incessantly circulated through them, by entering into one of the trunks and returning through the other, we shall be enabled to conceive how the blood is circulated through the vessels of the human body.

Every trunk of an artery, before it divides, is nearly cylindrical, or of equal diameter through its whole length, and so are all its branches when examined separately. But every trunk seems to contain less blood than the many branches do into which that trunk separates; and each of these branches probably contains less blood than the ramifications do into which it is subdivided; and it is the same with the veins; the volume of their several ramifications, when considered together, being found to exceed that of the great trunk which they form by their union.

The return of the blood through the veins to the heart, is promoted by the action of the muscles, and the pulsation of the arteries. And this return is likewise greatly assisted by the valves which are to be met with in the veins, and which constitute one of the great distinctions between them and the arteries. These valves, which are supposed to be formed by the inner coat of the veins, permit the blood to flow from the extremities towards the heart, but oppose its return. They are most frequent in the smaller veins. As the column of blood increases, they seem to become less necessary; and therefore in the vena cava ascendens, we meet with only one valve, which is near its origin.

The arteries are composed of several tunics. Some writers enumerate five of these tunics; but perhaps we may more properly reckon only three, viz. the nervous, muscular, and cuticular coats. The veins are by some anatomists described as having the same number of coats as the arteries; but as they do not seem to be irritable, we cannot with propriety suppose them to have a muscular tunic. We are aware of Dr Verchuir’s experiments to prove that the jugular and some other veins possess a certain degree of irritability; but it is certain, that his experiments, repeated by others, have produced a different effect; and even he himself allows, that sometimes he was unable to distinguish any such property in the veins. Both these series of vessels are nourished by still more minute arteries and veins, which are seen creeping over their coats, and ramifying through their whole substance, and are called vasa vasorum; they have likewise many minute branches of nerves.

The arteries are much stronger than the veins, and they seem to require this force to be enabled to reft the impetus with which the blood circulates through them, and to impel it on towards the veins.

When the heart contracts, it impels the blood into the arteries, and sensibly divides them; and these vessels again contract, as the heart becomes relaxed to receive more blood from the auricles; so that the cause of the contraction and dilatation of the arteries seems to be easy to be understood, being owing in part to their own contractile power, and in part to the action of the heart; but in the veins, the effects of this impulse not being so sensibly felt, and the vessels themselves having little or no contractile power, the blood seems to flow in a constant and equal stream; and this, together with its passing gradually from a small channel into a larger one, seems to be the reason why the veins have no pulsatory motion, except the large ones near the heart; and in these it seems to be occasioned by the motion of the diaphragm, and by the regurgitation of the blood in the cavæ.

Sect.

(c) In the extremities, some of the deep-seated veins, and all the superficial ones, take a course different from that of the arteries.
The heart, at the time it contracts, drives the blood from its ventricles into the arteries; and the arteries being thus filled and distended, are naturally inclined to contract the moment the heart begins to dilate, and cease to supply them with blood. The alternate motions of contraction and dilatation of the heart and arteries, are distinguished by the names of systole and dia­stole. When the heart is in a state of contraction or systole, the arteries are at that instant distended with blood, and in their dia­stole, and it is in this state we feel their pulsatory motion, which we call the pulse. When the heart dilates, and the arteries contract, the blood is impelled onwards into the veins, through which it is returned back to the heart. While the heart, however, is in its systole, the blood cannot pass from the veins into the ventricles, but is detained in the auricles, which are two reservoirs formed for this use, till the dia­stole, or dilatation of the heart, takes place; and then the distended auricles contract, and drive the blood into the ventricles: so that the auricles have an alternate systole and dia­stole as well as the heart.

Although both the ventricles of the heart contract at the same time, yet the blood passes from one to the other. In the same moment, for instance, that the left ventricle drives the blood into the aorta, the right ventricle impels it into the pulmonary artery, which is distributed through all the substance of the lungs. The blood is afterwards brought back into the left ventricle by the pulmonary vein, at the same time that the blood is returned to the cavas, into the right ventricle, from all the other parts of the body.

This seems to be the mode of action of the heart and its vessels: but the cause of this action has, like all other intricate and interesting subjects, been differently explained. It seems to depend on the stimulus made on the different parts of the heart by the blood itself, which by its quantity and heat, or other properties, is perhaps capable of first exciting that motion, which is afterwards continued through life, independent of the will, by a regular return of blood to the auricles, in a quantity proportioned to that which is thrown into the arteries.

The heart possesses the vice infecta, or principle of irritability, in a much greater degree than any other muscle of the body. The pulse is quicker in young than in old subjects, because the former are cat. par. more irritable than the latter. Upon the same principle we may explain, why the pulse is constantly quicker in weak than in robust persons.

After what has been observed of the structure and action of the heart and its auricles, and likewife of the arteries and veins, there seem to be but very few arguments required to demonstrate the circulation of the blood, which has long since been established as a medical truth. This circulation may be defined to be a perpetual motion of the blood, in consequence of the action of the heart and arteries, which impel it through all the parts of the body, from whence it is brought back by the veins to the heart.

A very satisfactory proof of this circulation, and a proof easy to be understood, may be deduced from the different effects of pressure on an artery and a vein. If a ligature, for instance, is passed round an artery, the vessel swells considerably between the ligature and the heart; whereas if we tie up a vein, it only becomes filled between the extremity and the ligature, and this is what we every day observe in bleeding. The ligature we pass round the arm on these occasions, compresses the superficial veins; and the return of the blood through them being impeded, they become distended. When the ligature is too loose, the veins are not sufficiently compressed; and the blood continues its progress towards the heart; and, on the contrary, when it is made too tight, the arteries themselves become compressed; and the flow of the blood through them being impeded, the veins cannot be distended.

Another phenomenon, which effectually proves the circulation, is the loss of blood that every living animal sustains by opening only a single artery of a moderate size; for it continues to flow from the wounded vessel till the equilibrium is destroyed which is essential to life. This truth was not unknown to the ancients; and it seems strange that it did not lead them to a knowledge of the circulation, as it sufficiently proves, that all the other vessels must communicate with that which is opened. Galen, who lived more than 1500 years ago, drew this conclusion from it; and if we further observe, that he describes (after Erasistratus, who flourished about 450 years before him) the several valves which have long since been distinguished as erasistinum and serum. The erasistinum is the red coagulum, and the serum is the water in which it floats. Each of these may be again separated into two others; for the erasistinum, by being...
repeatedly washed in warm water, gives out all its red globules, and what remains appears to be composed of the coagulable lymph (r), which is a gelatinous substance, capable of being hardened by fire till it becomes perfectly horne: and if we expose the ferum to a certain degree of heat, part of it will be found to coagulate like the white of an egg, and there will remain a clear and limpid water, resembling urine both in its appearance and smell.

The ferum and crassaflamentum differ in their proportion in different constitutions; in a strong person, the crassaflamentum is in a greater proportion to the serum than in a weak one; and the same difference is found to take place in diseases (c).

**Sect. XV. Of Nutrition.**

The variety of functions which we have described as being incessantly performed by the living body, and the continual circulation of the blood through it, must necessarily occasion a constant dissipation of the several parts which enter into its composition. In speaking of the insensible perpiration, we observed how much was incessantly passing off from the lungs and the surface of the skin. The discharge by urine is likewise every day considerable; and great part of the bile, fæliva, &c. are excluded by stool. But the solid, as well as the fluid parts of the body, require a constant renewal of nutritious particles. They are exposed to the attrition of the fluids which are circulated through them; and the contraction and relaxation they repeat so many thousand times in every day, would necessarily occasion a diffusion of the machine, if the renewal was not proportioned to the waste.

It is easy to conceive how the chyle formed from the aliment is assimilated into the nature of blood, and repairs the loss of the fluid parts of our body; but how the solids are renewed, has never yet been satisfactorily explained. The nutritious parts of the blood are probably deposed by the arteries by exsudation through their pores into the tela cellulosæ; and as the solid parts of the body are in the embryo only a kind of jelly, which gradually acquires the degree of consistence they are found to have when the body arrives at a more advanced age; and these same parts which consist of bones, cartilages, ligaments, muscles, &c. are sometimes reduced again by disease to a gelatinous state; we may, with some degree of probability, consider the coagulable lymph as the source of nutrition.

If the supply of nourishment exceeds the degree of waste, the body increases; and this happens in infancy and in youth: for at those periods, but more particularly the former one, the fluids bear a large proportion to the solids; and the fibres being soft and yielding, are proportionably more capable of extension and increase. But when the supply of nutrition only equals the waste, we neither increase nor decrease; and we find this to be the case when the body has attained its full growth or acme: for the solids having then acquired a certain degree of firmness and rigidity, do not permit a farther increase of the body. But as we approach to old age, rigidity begins to be in excess, and the fluids (n) bear a much less proportion to the solids than before. The dissipation of the body is greater than the supply of nourishment; many of the smaller vessels become gradually impervious (t); and the fibres losing their moisture and their elasticity, appear flaccid and wrinkled. The lilies and the roses disappear, because the fluids by which they were produced can no longer reach the extremities of the capillary vessels of the skin. As these changes take place, the nervous power being proportionally weakened, the irritability and sensibility of the body, which were formerly so remarkable, are greatly diminished; and in advanced life, the hearing, the eye-sight, and all the other senses, become gradually impaired.

**Sect. XVI. Of the Glands and Secretions.**

The glands are commonly understand to be small, roundish, or oval bodies formed by the convolution of a great number of vessels, and destined to separate particular humours from the mass of blood.

They are usually divided into two classes; but it seems more proper to distinguish three kinds of glands, viz. the mucus, conglobate, and conglomerate.

The mucous glands, or follicles, as they are most commonly called, are small cylindrical tubes continued from...
from the ends of arteries. In some parts of the body, as in the tonsils, for example, several of these follicles may be seen folded together in one common covering, and opening into one common sinus. These follicles are the vessels that secrete and pour out mucus in the mouth, oesophagus, stomach, intestines, and other parts of the body.

The conglutinate glands are peculiar to the lymphatic system. Every lymphatic vein passes through a gland of this kind in its way to the thoracic duct. They are met with in different parts of the body, particularly in the axilla, groin, and mefentery, and are either solitary or in distinct clusters.

The conglutinate glands are of much greater bulk than the conglutinate, and seem to be an allemeage of many smaller glands. Of this kind are the liver, kidneys, &c. Some of them, as the pancreas, parotids, &c. have a granulated appearance. All these conglutinate glands are plentifully supplied with blood vessels; but their nerves are in general very minute, and few in number. Each little granulated portion furnishes a small tube, which unites with other similar ducts, to form the common excretory duct of the gland.

The principal glands, and the humours they secrete, have been already described in different parts of this work; and there only remains for us to examine the general structure of the glands, and to explain the mechanism of secretion. On the first of these subjects two different systems have been formed; each of which has had, and still continue to have, its adherents. One of these systems was advanced by Malpighi, who suppos'd that an artery entering into a gland ramifies very minutely through its substance, and that its branches ultimately terminate in a vescicular cavity or follicle, from whence the secreted fluid passes out through the excretory duct. This doctrine at first met with few opponents; but the celebrated Ruych, who first attempted minute injections with wax, afterwards disputed the existence of these follicles, and asserted, that every gland appears to be a continued series of vessels, which after being repeatedly convoluted in their course through its substance, at length terminate in the excretory duct. This doctrine is still divided between these two systems: that of Malpighi, however, seems to be the best founded. The mode of secretion has been explained in a variety of ways, and they are all perfectly hypothetical. In such an inquiry it is natural to ask, how one gland constantly separates a particular humour, while another gland secretes one of a very different nature from the blood? The bile, for instance, is separated by the liver, and the urine by the kidneys. Are these secretions to be imputed to any particular dispositions in the fluids, or is their cause to be looked for in the fluids? It has been suppos'd, that every gland contains within itself a fermenting principle, by which it is enabled to change the nature of the blood it receives, and to endue it with a particular property. So that, according to this system, the blood, as it circulates through the kidneys, becomes mixed with the fermenting principle of those glands, and a part of it is converted into urine; and again, in the liver, in the biliary and other glands, the bile, the saliva, and other juices, are generated from a similar cause. But it seems to be impossible for any liquor to be confined in a place exposed to the circulation, without being carried away by the torrent of blood, every part of which would be equally affected; and this system of fermentation has long been rejected as vague and chimerical. But as the cause of secretion continued to be looked for in the fluids, the former system was succeeded by another, in which recourse was had to the analogy of the humours. It was observed, that if paper is moistened with water, and oil and water are afterwards poured upon it, that the water only will be permitted to pass through it; but that, on the other hand, if the paper has been previously soaked in oil instead of water, the oil only, and not the water, will be filtered through it. These observations led to a supposition, that every secretory organ is originally furnished with a humour analogous to that which it is afterwards defined to separate from the blood; and that in consequence of this disposition, the secretory vessels of the liver, for instance, will only admit the bilious particles of the blood, while all the other humours will be excluded. This system is an ingenious one, but the humour with which it abounds are unanswerable; for oil and water are immiscible; whereas the blood, as it is circulated through the body, appears to be an homogeneous fluid. Every oil will pass through a paper moistened only with one kind of oil; and wine, or spirits mixed with water, will easily be filtered through a paper previously soaked in water. Upon the same principle, all our humours, though differing in their other properties, yet agreeing in that of being perfectly miscible with each other, will all easily pass through the same filter.—But these are not all the objections to this system. The humours which are supposed to be placed in the secretory vessels for the determination of similar particles of the blood, must be originally separated without any analogous fluid; and that which happens once, may as easily happen always. Again, it sometimes happens from a vicious disposition, that humours are filtered through glands which are naturally not intended to afford them a passage; and when this once has happened, it ought, according to this system, to be expected always to do so: whereas this is not the case; and we are, after all, naturally led to seek for the cause of secretion in the solids. It does not seem right to ascribe it to any particular figure of the secretory vessels; because the soft texture of those parts does not permit them to preserve any constant shape, and our fluids seem to be capable of accommodating themselves to every kind of figure. Some have imputed it to the difference of diameter in the oriifices of the different secretory vessels. To this doctrine objections have likewise been raised; and it has been argued, that the vessels of the liver, for instance, would, upon this principle, afford a passage not only to the bile, but to all the other humours of less consistence with it. In reply to this objection, it has been suppos'd, that secondary vessels exist, which originate from the first, and permit all the humours thinner than the bile to pass through them.

Each of these hypotheses is probably very remote from the truth.
This plate represents the Heart in situ, all the large Arteries and Veins, with some of the Muscles, &c.

Muscles, &c.—Superior Extremity.—a, M. Maffeter. b, Complexus. c, Digastricus. d, Os hyoides. e, Thyroid gland. f, Levator scapulae. g, Cuillaris. h, The clavicles cut. i, The deltoid muscle. k, Biceps flexor cubiti cut. l, Coraco-brachialis. m, Triceps extensor cubiti. n, The heads of the pronator teres, flexor carpi radiales, and flexor digitorum superficialis, cut. o, The flexor carpi-ularis, cut at its extremity. p, Flexor digitorum profundus. q, Supinator radii longus, cut at its extremity. r, Ligamentum carpi transversale. s, Extensor carpi radiales. t, Latissimus dorsi. u, Anterior edge of the serratus anterior major. v, v, The inferior part of the diaphragmn. w, w, Its anterior edge cut. x, x, The kidneys. y, Transversus abdominis. z, Os ilium.

Inferior Extremity.—a, Psoas magnus. b, Iliacus internus. c, The dfly origin of the tenor vaginae femoris. d, d, The obliquus pubis cut from each other. e, Musculus pectineus cut from its origin. f, Short head of the triceps abdominis femoris cut. g, The great head of the triceps. h, The long head cut. i, Vasa interna. k, Vastus externus. l, Crureus. m, Gemellus. n, Soleus. o, Tibia. p, Peroneus longus. q, Peroneus brevis. r, Fibula.

Heart and Blood-vessels.—a, The heart, with the coronary artery and veins. b, The right auricle of the heart. c, The aorta ascendens. d, The left subclavian artery. e, The left carotid artery. f, The common trunk which sends off the right subclavian and right carotid arteries. g, The carotis externa. h, The carotis interna, which sends off the coronary arteries of the lips. i, Arteria temporalis profunda. k, Aorta descendens. l, The iliac arteries,—which sends off M.M., The femoral or crural arteries. N.B. The other arteries in this figure have the same distribution as the veins of the same name:—And generally, in the anatomical plates, the description to be found on the one side, points out the same parts in the other.

1, The frontal vein. 2, The facial vein. 3, Vena temporalis profunda. 4, Vena occipitalis. 5, Vena jugularis externa. 6, Vena jugularis interna, covering the arteria carotis communis. 7, The vasa cerebri arcus on the palm of the hand, which is formed by, 8, The radial artery and vein, and 9, The ulnar artery and vein. 10, 10, The cephalic vein. 11, Basilic vein, that on the right side cut. 12, Median vein. 13, The humeral vein, which, with the median, covers the humeral artery. 14, 14, The external thoracic or mammary artery and veins. 15, The axillary vein, covering the artery. 16, 16, The subclavian veins, which, with the jugulars, form, 17, The vena cava superior. 18, The cutaneous arch of veins on the fore part of the foot. 19, The vena tibiflásis antica, covering the artery. 20, The vena profunda femoris, covering the artery. 21, The upper part of the vena saphena major. 22, The femoral vein. 23, 23, The iliac veins. 24, 24, Vena cava inferior. 25, 25, The renal veins covering the arteries. 26, 26, The diaphragmatic veins.

Part V. Of the Brain and Nerves.

Sect. I. Of the Brain and its Integuments.

The bones of the cranium were described in the opeological part of this work, as including the brain, and defending it from external injury: but they are not its only protection; for when we make an horizontal section through these bones, we find this mass everywhere surrounded by two membranes (X), the dura and pia mater.—The first of these lines the interior surface of the cranium, to which it everywhere adheres strongly (t), but more particularly at the futures, and at the many foramina through which vessels pass between it and the pericranium. The dura mater (X) is perfectly smooth and inelastic, and its inner surface is constantly bedewed with a fine pellicular fluid, which every where separates it from the pia mater. The dura mater sends off several considerable processes, which divide the brain into separate portions, and prevent them from compressing each other. Of these processes there is one superior, and longitudinal, called the falx, or falxiform process, from its resemblance to a clyythe. It arises from the spine of the os frontis, near the chrysia galli, and extending along in the direction of the sagittal future, to beyond the lamboidal future, divides the brain into two hemi-
Of Cerebrum. Of the hemispheres. A little below the lambdoidal suture, it divides into two broad wings or expansions called the tranverse or lateral processes, which prevent the lobes of the cerebrum from pressing on the cerebellum. Besides these there is a fourth, which is situated under the transverse processes, and being continued to the spine of the occiput, divides the cerebellum into two lobes.

The blood, after being distributed through the cavity of the cranium by means of the arteries, is returned, as in the other parts of the body, by veins which all pass on to certain channels, situated behind these several processes.

These canals or sinuses communicate with each other, and empty themselves into the internal jugular veins, which convey the blood into the vena cava. They are supplied as in the other parts of the body, by vessels which return the blood at the union of these two veins, is as it were, in a plexus, as in the other parts of the body, by vessels which return the blood at the union of these two veins, is as it were, in a plexus. Besides these four canals, which were known to the ancients, modern anatomists enumerate many others, by giving the appellation of sinuses to other veins of the dura mater, which for the most part empty themselves into some of those we have just now described. There are the inferior longitudinal sinus, the superior and inferior petrous sinuses, the cavernous sinuses, the circular sinuses, and the anterior and posterior occipital sinuses.

These sinuses or veins, by being conveyed through a thick dense membrane, firmly suspended, as the dura mater is, within the cranium, are less liable to rupture; at the same time they are well supported, and by running every where along the inner surface of the bones, they are prevented from pressing on the substance of the brain. To prevent too great a dilatation of them, we find filaments (called chorda Willisii, from their having been first noticed by Willis) stretched across their cavities; and the oblique manner in which the veins from the brain run through the substance of the brain into these channels, serves the purpose of a valve, which prevents the blood from turning back into the smaller and weaker vessels of the brain.

The pia mater is a much fother and finer membrane than the dura mater; being exceedingly delicate, transparent, and vaeferular. It invests every part of the brain and sends off an infinite number of elongations, which infinuate themselves between the convolutions, and even into the substance of the brain. This membrane is composed of two laminae; of which the external one is named tunica arachnoidea, from its thinness, which is equal to that of a spider's web. These two laminae are intimately adherent to each other at the upper part of the brain, but are easily separable at the basis of the brain, and through the whole length of the medulla spinalis. The external layer, or tunica arachnoidea, appears to be spread uniformly over the surface of the brain, but without entering into its furrows as the inner layer does; the latter being found to intermingle itself between the convolutions, and even into the interior cavities of the brain. The blood-vessels of the brain are distributed through it in their way to that organ, and are therefore divided into very minute ramifications, before they penetrate the substance of the brain.

There are several parts included under the general denomination of brain. One of these, which is of the softest consistence, and fills the greatest part of the cavity of the cranium, is the cerebrum, or brain, properly so called. Another portion, which is seated in the inferior and posterior part of the head, is the cerebellum; and a third, which derives its origin from both theee, is the medulla oblongata.

The cerebrum is a medullary mass of a moderate consistence, filling up exactly all the upper part of the cavity of the cranium, and divided into two hemispheres by the falx of the dura mater. Each of these hemispheres is usually distinguished into an anterior, a middle, and a posterior lobe. The first of these is lodged on the orbital processes of the os frontis; the middle lobes lie on the middle fossa of the basis of the cranium, and the posterior lobes are placed on the transverse septum of the os occipitis, immediately over the cerebellum, from which they are separated by the lateral processes of the dura mater. These two portions afford no distinguishing mark of separation; and on this account Haller, and many other modern anatomists, omit the distinction of middle lobe, and speak only of the anterior and posterior lobes of the brain.

The cerebrum appears to be composed of two distinct substances. Of these, the exterior one, which is of a greyish or ash-colour, is called the cortex, and is somewhat softer than the other, which is very white, and is called medulla or substantia alba.

After having removed the falx, and separated the two hemispheres from each other, we perceive a white convex body, the corpus callosum, which is a portion of the medullary substance, uniting the two hemispheres to each other, and not invested by the cortex. By making an horizontal incision in the brain, on a level with this corpus callosum, we discover two oblong cavities, named the anterior or lateral ventricles, one in each hemisphere. These two ventricles, which communicate with each other by a hole immediately under the plexus choroides, are separated laterally by a very fine medullary partition, called septum lucidum, from its thinness and transparency. The lower edge of this septum is fixed to the fornix, which is a kind of medullary arch (as its name implies) situated under the corpus callosum, and nearly of a triangular shape. Anteriorly the fornix sends off two medullary chords, called its anterior crura; which seem to be united to each other by a portion of medullary substance, named commissura anterior cerebri. These crura diverging from one another, are lost at the outer side of the lower and fore-part of the third ventricle. Posteriorly the fornix is formed into two other chords, which unite with two medullary protuberances called pedes hippocampi, and sometimes cornua ammonis, that extend along the back-part of the lateral ventricles. The concave edge of the pedes hippocampi is covered by a medullary lamina, called corpus subhriatum.

Neither the edges of the fornix, nor its posterior crura, can be well distinguished, till we have removed the plexus choroides. This is a production of the pia mater, which is spread over the lateral ventricles. Its loofe
loose edges are collected, so as to appear like a vascular band on each side.

When we have removed this plexus, we discover several of these protuberances included in the lateral ventricles. These are the corpora striata, the thalami nervorum opticorum, the tubercula quadrigemina, and the pineal gland.

The corpora striata are two curved oblong eminences, that extend along the anterior part of the lateral ventricles. They derive their name from their striated appearance, which is owing to an intermixture of the cortical and medullary substances of the brain. The thalami nervorum opticorum are so called, because the optic nerves arise chiefly from them, and they are likewise composed both of the cortex and medulla. They are separated from the corpora striata only by a kind of medullary chord, the geminum centrum semi-circulare. The thalami are nearly of an oval shape, and are situated at the bottom of the upper cavity of the lateral ventricles. They are closely united, and at their convex part seem to become one body.

Anteriorly, in the space between the thalami, we observe an orifice by which the lateral ventricles communicate, and another leads down from this, under the different appellations of foramen commune anterius, vulva iter ad infundibulum, but more properly iter ad tertium ventriculorum; and the separation of the thalami from each other posteriorly, forms another opening or interface called annus. This has been supposed to communicate with the third ventricle; but it does not, the bottom of it being shut up by the pia mater.

The back part of the annus is formed by a kind of medullary band, which connects the thalami to each other, and is called commissura posterior cerebri.

Behind the thalami and commissura posterior, we observe a small, soft, greyish, and oval body, about the size of a pea. This is the glandula pinealis; it is described by Galen under the name of convulsion, and has been rendered famous by Descartes, who supposed it to be the seat of the soul. Galen seems formerly to have entertained the same opinion. Some modern writers have, with as little reason, imagined that the soul is placed in the corpus callosum.

The pineal gland rests upon four remarkable eminences, disposed in pairs, and seated immediately below it. These tubercles, which by the ancients were called testis and nates, have, since the time of Winlow, been more commonly named tubercula quadrigemina.

Under the thalami we observe another cavity, the third ventricle, which terminates anteriorly in a small medullary canal, the infundibulum, that leads to the glandula pituitaria. It has been doubted, whether the infundibulum is really hollow; but some late experiments on this part of the brain by Professor Murray of Upsal, clearly prove it to be a medullary canal, surrounded by both lamina of the pia mater. After freezing the brain, this channel was found filled with ice; and de Haen tells us, he found it dilated, and filled with a calcareous matter (N).

The soft spongy body in which the infundibulum terminates, was by the ancients supposed to be of a glandular structure, and defined to filter the ferosity of the brain. Spigelius pretended to have discovered its excretory duct, but it seems certain that no such duct exists. It is of an oblong shape, composed, as it were, of two lobes. In ruminant animals it is much larger than in man.

From the posterior part of the third ventricle, we see a small groove or channel, descending obliquely backwards. This channel, which is called the aqueducus Sylvii, though it was known to the ancients, opens into another cavity of the brain, placed between the cerebellum and medulla oblongata, and called the fourth ventricle.

The cerebellum, which is divided into two lobes, is commonly supposed to be of a firmer texture than the cerebrum; but the truth is, that in the greater number of subjects, there appears to be no sensible difference in the consistence of these two parts. It has more of the cortical than of the medullary substance in its composition.

The furrow that divides the two lobes of the cerebellum leads anteriorly to a process, composed of medullary and cortical substances, covered by the pia mater, and which, from its being divided into numerous furrows, resembling the rings of the earth-worm, is named procedus vermis. This process forms a kind of ring in its course between the lobes.

The surface of the cerebellum does not afford those circumvolutions which appear in the cerebrum; but instead of these, we observe a great number of minute furrows, running parallel to each other, and nearly in a transverse direction. The pia mater invests itself into these furrows.

When we cut into the substance of the cerebellum, from above downwards, we find the medullary part running in a kind of ramifying course, and exhibiting an appearance that has got the name of arbor vitae. These ramifications unite to form a medullary trunk; the middle, anterior, and most considerable part of which forms two processes, the crus cerebrali; which unite with the crus cerebelli, to form the medulla oblongata. The last furnishes two other processes, which lose themselves under the nates, and thus unite the lobes of the cerebellum to the posterior part of the cerebrum. Under the nates we observe a transverse medullary line, or linea alba, running from one of these processes to the other; and between them we find a very thin medullary lamina, covered with the pia mater, which the generality of anatomists have (though seemingly without reason) considered as a valve formed for closing the communication between the fourth ventricle and the aqueductus Sylvii. Vieussens named it vulvula major cerebri.

The medulla oblongata is situated in the middle, lower, and posterior part of the cranium, and may be considered as a production or continuation of the whole medullary substance of the cerebrum and cerebellum, being formed by the union of two considerable medullary processes of the cerebrum, called crura cerebri.
The crura cerebri arise from the middle and lower parts of each hemisphere. They are separated from each other at their origin, but are united below, where they terminate in a middle protuberance, the *pons Varolii*, so called, because Varolius compared it to a bridge. This name, however, can convey no idea of its real appearance. It is, in fact, nothing more than a medullary protuberance, nearly of a semi-spherical shape, which unites the crura cerebri to those of the cerebellum.

Between the crura cerebri, and near the anterior edge of the *pons Varolii*, are two tubercles, composed externally of medullary, and internally of cinneritous substance, to which Eufrachius first gave the name of *eminentes mamillares*.

Along the middle of the posterior surface of the medulla oblongata, where it forms the anterior part of the fourth ventricle, we observe a kind of furrow which runs downwards and terminates in a point. About an inch above the lower extremity of this fissure, several medullary filaments are to be seen running towards it on each side in an oblique direction, so as to give it the appearance of a writing-pen; hence it is called *calamus scriptorius*.

From the posterior part of the *pons Varolii*, the medulla oblongata descends obliquely backwards: at its fore-part, immediately behind the *pons Varolii*, we observe two pair of eminences, which were described by Eufrachius, but received no particular appellation till the time of Vieuwens, who gave them the names of *corpora olivaria* and *corpora pyramidalia*. The former are the outermost, being placed one on each side. They are nearly of an oval shape, and are composed of medulla, with streaks of cortical substance. Between these are the *corpora pyramidalia*, each of which terminates in a point. In the human subject these four eminences are sometimes not easily distinguished.

The *medulla spinalis*, or spinal marrow, which is the name given to the medullary chord that is extended down the vertebral canal, from the great foramen of the occipital bone to the bottom of the last lumbar vertebra, is a continuation of the medulla oblongata. Like the other parts of the brain, it is invected by the dura and pia mater. The first of these, in its passage out of the cranium, adheres to the foramen of the os occipitis. Its connection with the ligamentary substance that lines the cavity of the spine, is only by means of cellular membrane; but between the several vertebrae, where the nerves pass out of the spine, it sends off prolongations, which adhere strongly to the vertebral ligaments. Here, as in the cranium, the dura mater has its sinuses or large veins. There are two in number, and are seen running on each side of the medullary column, from the foramen magnum of the os occipitis to the lower part of the os facetum. They communicate together by ramifying branches at each vertebra, and terminate in the vertebral, intercostal, and facral veins.

The pia mater is connected with the dura mater by means of a thin transparent substance, which from its indentations between the spinal nerves has obtained the name of *ligamentum denticulatum*. It is somewhat firmer than the unica arachnoidea, but in other respects resembles that membrane. Its use is to support the spinal marrow, that it may not affect the medulla oblongata by its weight.

The spinal marrow itself is externally of a white colour; but upon cutting into it we find its middle-part composed of a darker coloured mass, resembling the cortex of the brain. When the marrow has reached the first lumbar vertebra, it becomes extremely narrow, and at length terminates, in an oblong protuberance; from the extremity of which the pia mater sends off a prolongation or ligament, resembling a nerve, that perforates the dura mater, and is fixed to the os coccygis.

The medulla spinalis gives rise to 30 or 31 pair of nerves, but they are not all of the same size, nor do they all run in the same direction. The upper ones are thinnest than the rest, and are placed almost transversely: as we descend we find them running more and more obliquely downwards, till at length their course is almost perpendicular, so that the lowermost nerves exhibit an appearance that is called *coda equina*, from its resemblance to a horse's tail.

The arteries that ramify through the different parts of the brain, are derived from the internal carotid and from the vertebral arteries. The *medulla spinalis* is supplied by the anterior and posterior spinal arteries, and likewise receives branches, from the cervical, the inferior and superior intercostal, the lumbar, and the facral arteries.

**Sect. II. Of the Nerves.**

The nerves are medullary chords, differing from each other in size colour and consistence and deriving their origin from the medulla oblongata and *medulla spinalis*. There are 39, and sometimes 40, pair of these nerves; nine (o) of which originate from the medulla oblongata, and 30 or 31 from the *medulla spinalis*. They appear to be perfectly inelastic, and like wire to pullets no irritability. If we irritate muscular fibres, they immediately contract; but nothing of this sort happens if we irritate a nerve. They carry with them a covering from the pia mater; but derive no tunic from the dura mater, as hath been generally, though erroneously, supposed, ever since the time of Galen (p),

(o) It has been usual to describe the ten pair of nerves as arising from the medulla oblongata; but as the tenth pair arise in the same manner as the other spinal nerves, Santorini, Heister, Haller, and others, seem very properly to have clasped them among the nerves of the spine.

(p) Baron Haller and Professor Zinn seem to have been the first who demonstrated, that the dura mater is reflected upon and adheres to the periosteum at the edges of the foramina that afford a passage to the nerves out of the cranium, and vertebral canal, or is soon lost in the cellular substance.
ANATOMY

Part V.

Of the Brain and Nerves.

the outer covering of the nerves being in fact nothing more than the cellular membrane. This covering is very thick where the nerve is exposed to the action of muscles; but where it runs through a bony canal, or is secure from pressure, the cellular tunic is extremely thin, or altogether wanting. We have instances of fasciculi being separated by the ligamentum denticulatum, this in the partio mollis of the auditory nerve, and in after which we find them contiguous to one another.

By elevating, carefully and gently, the brain from the basin of the cranium, we find the first nine pairs arising in the following order: 1. The nervi olfactorii, distributed through the pia mater, which constitutes the organ of smell. 2. The optical, which go to the eyes, where they receive the impressions of visible objects. 3. The oculorum motorius, so called because they are distributed to the muscles of the eye. 4. The pathetici, distributed to the superior oblique muscles of the eye, the motion of which is expressive of certain passions of the soul. 5. The nerves of this pair soon divide into three principal branches, and each of these has a different name. Its upper division is the opthalmalicus, which is distributed to various parts of the eyes, eye-lids, forehead, nose, and integuments of the face. The second is called the maxillarius superior, and the third maxillarius inferior; both which names allude to their distribution. 6. The abductores; each of these nerves is distributed to the abductor muscle of the eye, so called, because it helps to draw the globe of the eye from the nose. 7. The auditorii (q), which are distributed through the organs of hearing. 8. The par vagum, which derives its name from the great number of parts to which it gives branches both in the thorax and abdomen. 9. The linguales, or hypo-glossi, which are distributed to the tongue, and appear to contribute both to the organ of taste and to the motions of the tongue (s).

It has already been observed, that the spinal marrow sends off 30 or 31 pair of nerves; these are chiefly distributed to the exterior parts of the trunk and to the extremities. They are commonly distinguished into the cervical, dorsal, lumbar, and sacral nerves. The cervical, which pass out through the intercostal nerve of the cranium, is eight (s) in number; the dorsal, twelve; the lumbar, five; and the sacral, five or six; the number of the latter depending on the number of holes in the os sacrum. Each spinal nerve at its origin is composed of two fasciculi of medullary fibres. One of these fasciculi arise from the anterior, and the other from the posterior, surface of the medulla. These fasciculi are separated by the lamina denticulatum, after which we find them contiguous to one another. They then perforate the dura mater, and unite to form a considerable knot or ganglion. Each of these ganglions sends off two branches; one anterior, and the other posterior. The anterior branches communicate with each other at their coming out of the spine, and likewise send off one, and sometimes more branches, to assist in the formation of the intercostal nerve.

The knots or ganglions of the nerves just now spoken of, are not only to be met with at their exit from the spine, but likewise in various parts of the body. They occur in the nerves of the medulla oblongata, as well as in those of the spine. They are not the effects of disease, but are to be met with in the same parts of the same nerves, both in the fetus and adult. They are commonly of an oblong figure, and of a greyish colour, somewhat inclined to red, which is perhaps owing to their being extremely vascular. Internally we are able to distinguish something like an intermixture of the nervous filaments.

Some writers have considered them as so many little brains; Lancisi fancied he had discovered muscular fibres in them, but they are certainly not of an irritable nature. A late writer, Dr Johnstone, imagines the ganglia are intended to deprive us of the power of the will. If in other cases, the ganglia were well founded, we should meet with them only in the nerves leading to involuntary muscles; whereas it is certain, that the voluntary muscles receive their nerves through ganglions. Doctor Monro, from observing the accurate intermixture of the minute nerves which compose them, considers them as new sources of nervous energy.

The nerves, like the blood-veins, in their course through the body, communicate with each other; and each of these communications constitutes what is called a plexus, from whence branches are again detached to different parts of the body. Some of these are constant.

(a) This pair, soon after its entrance into the meatus auditorius internus, separates into two branches. One of these is of a very soft and pulpy consistence, is called the portio mollis of the seventh pair, and is spread over the inner part of the ear. The other passes out through the aqueduct of Falloppius in a firm chord, which is distinguished as the portio dura, and is distributed to the external ear and other parts of the neck and face.

(r) Heister has summed up the uses of these nine pair of nerves in the following Latin verses:

"Olficientis, cerumn, souloque movens, patiensque,"

"Genitans, abducens, audientisque, vagansque, loquensque."

(s) Besides these, there is another pair called accesorii, which arise from the medulla spinalis at its beginning, and ascending through the great foramen of the os occipitis into the cranium, passes out again close to the eighth pair, with which, however, it does not unite; and it is afterwards distributed chiefly to the muscles of the neck, back, and scapula. In this course it sends off filaments to different parts, and likewise communicates with several other nerves. Physiologists are at a loss how to account for the singular origin and course of these nervi accessorii. The ancients considered them as branches of the eighth pair, distributed to muscles of the scapula: Willis likewise considered them as appendages to that pair, and on that account named them accesorii. They are sometimes called the spinal pair: but as this latter name is applicable to all the nerves of the spine indiscriminately, it seems better to adopt that given by Willis.
Part V.

ANATOMY.

Of the Brain and Nerves.

The nerves are produced, no one has ever yet been able to determine. The inquiry has been founded altogether on hypothesis; but it seems to be an hypothesis derived from much more probable principles, and there are many ingenious arguments to be brought in its support.

Some physiologists have considered a trunk of nerves as a solid chord, capable of being divided into an infinite number of filaments, by means of which the premonitions of feeling are conveyed to the meninges commune. Others have supposed it to be a canal, which afterwards separates into more minute channels; or, perhaps, as being an assemblage of many very small and distinct tubes, connected to each other, and thus forming a cylindrical chord. They who contend for the being solid bodies, are of opinion, that feeling is occasioned by vibration; so that, for instance, according to this system, by prickings the finger, a vibration would be occasioned in the nerve, distributed through its substance; and the effects of this vibration, when extended to the meninges, would be an excitation of pain. But the inelasticity, the softness, the connection, and the situation of the nerves, are so many proofs that vibration has no share in the caufe of feeling.

Others have supposed, that in the brain and spinal marrow, a very subtle fluid is secreted, and from thence conveyed through the imperceptible tubes, which they consider as existing in the nerves. They have further supposed, that this very subtle fluid, to which they have given the name of animal spirit, is secreted in the cortical substance of the brain and spinal marrow, from whence it passes through the medullary substance. This, like the other system, is founded altogether on hypothesis; but it seems to be an hypothesis derived from much more probable principles, and there are many ingenious arguments to be brought in its support.

EXPLANATION

of PLATE XXIX.

Fig. 1. Represents the inferior part of the brain;—the anterior part of the whole Spine, including the Medulla Spinalis;—with the origin and large portions of all the nerves.


Nerves—11, The first pair of nerves, named olfactory, which go to the nose. 22, The second pair, named opticus, which goes to form the tunica retina of the eye. 33, The third pair, named motor ocularis; it supplies most of the muscles of the eye-ball. 44, The fourth pair, named ophthalmonicus,—which is wholly spent upon the muscles trochlearis of the eye. 55, The fifth pair; the division is made branches. The first, named opthalmonicus, goes to the orbit; supplies the lacrimal gland, and sends branches out to the forehead and nose. The second, named superior maxillary, supplies...
ANATOMY.

Of the Brain and Nerves.

supply the muscles and teguments that lie on the side of the neck and top of the shoulder. 16 The brachial plexus, formed by the fourth, fifth, sixth, seventh cervicals, and first dorsal nerves; which supply the muscles and teguments of the superior extremity. 17 The twelve dorsal, or proper intercostal nerves, which are sent upon the intercostal muscles and some of the large muscles which lie upon the thorax. 18 The five lumbar pairs of nerves, which supply the lumbar and abdominal muscles, and some of the teguments and muscles of the inferior extremity. 19 The sacrosciatic, or posterior crural nerve, formed by the two inferior lumbar, and three superior of the os sacrum. This large nerve supplies the greatest part of the muscles and teguments of the inferior extremity. 20 The ilomachic plexus, formed by the eighth pair and intercostals, which supply the intestines, kidneys, and chylopoietic viscera. 21 The three first cervical nerves.

Fig. 2, 3, 4, 5. Show different Views of the inferior part of the Brain, cut perpendicularly through the Middle,—with the Origin and large Portions of all the Nerves which pass out through the Bones of the Cranium,—and the three first Cervicals.


Nerves.—1 2 3 4 6 7 8 and 9, Paris of nerves. 10 10, Nervus accellerius, which comes from——11, 12, and 13, The three first cervical nerves.

PART VI. OF THE SENSES, AND THEIR ORGANS.

In treating of the senses, we mean to confine ourselves to the external ones of touch, taste, smelling, hearing, and vision. The word sense, when applied to these five, seems to imply not only the sensation excited in the mind by certain impressions made on the body, but likewise the organ destined to receive and transmit these impressions to the sensum. Each of these organs being of a peculiar structure, is susceptible only of particular impressions, which will be pointed out as we proceed to describe each of them separately.

SEC. I. OF TOUCH.

The sense of touch may be defined to be the faculty of perceiving certain properties of bodies by the feel. In a general acceptation, this definition might perhaps not improperly be extended to every part of the body possessed of sensibility (τ), but it is commonly confined to the nervous papillae of the cutis, or true skin, which, with its appendages, and their several uses, have been already described.

The exterior properties of bodies, such as their form, solidity, moisture, inequality, smoothness, dryness, or fluidity, and likewise their degree of heat, seem all to be capable of making different impressions on the papillae, and consequently of exciting different ideas in the sensum commune. But the organ of touch, like all the other senses, is not equally delicate in every part of the body, or in every subject; being in some much more exquisite than it is in others.

Sect. II. OF THE TASTE.

The sense of taste is seated chiefly in the tongue; the situation and figure of which are sufficiently known. On the upper surface of this organ we may observe a great number of papillae, which, on account of their difference in size and shape, are commonly divided into three classes. The largest are situated towards the base of the tongue. Their number commonly varies from seven to nine, and they seem to be mucous follicles. Those of the second class are somewhat smaller, and of a cylindrical shape. They are most numerous about the middle of the tongue. Those of the third class are very minute, and of a conical shape. They are

(τ) In the course of this article, mention has often been made of the sensibility or insensibility of different parts of the body: it will therefore, perhaps, not be amiss to observe in this place, that many parts which were formerly supposed to possess the most exquisite sense, are now known to have but little or no feeling, at least in a sound state; for in an inflamed state, even the bones, the most insensible parts of any, become susceptible of the most painful sensations. This curious discovery is due to the late Baron Haller. His experiments prove, that the bones, cartilages, ligaments tendons, epidermis, and membranes (as the pleura, pericardium, dura and pia mater, periosteum, &c.), may in a healthy state be considered as insensible. As sensibility depends on the brain and nerves, of course different parts will possess a greater or less degree of feeling, in proportion as they are supplied with a greater or smaller number of nerves. Upon this principle it is, that the skin, muscles, stomach, intestines, urinary bladder, ureters, uterus, vagina, penis, tongue, and retina, are extremely sensible, while the lungs and glands have only an obscure degree of feeling.
ANATOMY.

Part VI.

The sense of smelling, like the sense of taste, seem intended to direct us to a proper choice of aliment, and is chiefly seated in the nose, which is distinguished into its external and internal parts. The situation and figure of the former of these do not seem to require a definition. It is composed of bones and cartilages, covered by muscular fibres and by the common integuments. The bones make up the upper portion, and the cartilages the lower one. The septum narium, like the nose, is likewise in part bony, and in part cartilaginous. These bones and their connections were described in the osteology.

The internal part of the nose, besides the osseous spongiosa, has six cavities or sinuses, the maxillary, the frontal, and the phrenoid, which were all described with the bones of the head. They all open into the nostrils; and the nose likewise communicates with the mouth, larynx, and pharynx, posteriorly behind the velum palatii.

All these several parts, which are included in the internal division of the nose, viz. the inner surface of the nostrils, the lamellæ of the osseous spongiosa, and the sinuses, are lined by a thick and very vascular membrane, which, though not known to the古代人, was first well described by Schneider*, and is therefore now commonly named membrana papillaria Schneideri. This membrane is truly the organ of smelling; but its real structure does not yet seem to be perfectly understood. It appears to be a continuation of the cuticle, which lines the inner surface of the mouth. In some parts of the nose it is smooth and firm, and in others it is loose and spongy. It is constantly moistened by a mucous secretion; the finer parts of which are carried off by the air we breathe, and the remainder, by being retained in the sinuses, acquires considerable consistence.

The manner in which this mucus is secreted has not yet been satisfactorily ascertained; but it seems to be by means of mucous follicles.

Its arteries are branches of the internal maxillary and internal carotid. Its veins empty themselves into the internal jugulars. The first pair of nerves, the olfactory, are spread over every part of it, and it likewise receives branches from the fifth pair.

After what has been said of the pituitary membrane, it will not be difficult to conceive how the air we draw in at the nostrils, being impregnated with the effluvia of bodies, excites in us that kind of sensation we call smelling. As these effluvia, from their being exceedingly light and volatile, cannot be capable in a small quantity of making any great impression on the extremities of the olfactory nerves, it was necessary to give considerable extent to the pituitary membrane, that by this means a greater number of odoriferous particles might be admitted at the same time. When we wish to take in much of the effluvia of any thing, we naturally close the mouth, that all the air we inspire may pass through the nostrils; and at the same time, by means of the muscles of the nose, the nostrils are dilated, and a greater quantity of air is drawn in.

In many quadrupeds, the sense of smelling is much more extensive and delicate than it is in the human subject; and in the human subject it seems to be more perfect the less it is vitiated by sickness and in health. The great use of the taste seems to be to enable us to distinguish wholesome and salutary food from that which is unhealthy; and we observe that many quadrupeds, by having their papillæ (v) very large and long, have the faculty of distinguishing flavours with infinite accuracy.

Sect. III. Of Smelling.

...
found to have several muscles. Different parts of it are distinguished by different names; all its cartilaginous part is called aia or wing; to distinguish it from the soft and pendent part below, called the lobe. Its outer or border is called antihelix, and the semicircle within this, antihelix. The movable cartilage placed immediately before the meatus auditorius, which it may be made to close exactly, is named tragus; and an eminence opposite to this at the extremity of the antihelix, is called antitragus. The concha is a considerable cavity formed by the extremities of the helix and antihelix. The meatus auditorius, which at its opening is cartilaginous, is lined with a very thin membrane, which is a continuation of the cuticle from the surface of the ear.

In this canal we find a yellow wax, which is secreted by a number of minute glands or follicles, each of which has an excretory duct. This secretion, which is at first of an oily consistence, defends the membrane of the tympanum from the injuries of the air; and by its bitterness, prevents minute insects from entering into the ear. But when from neglect or disease it accumulates in too great a quantity, it sometimes occasions deafness. The inner extremity of the meatus is closed by a very thin transparent membrane, the membrana tympani, which is set in a bony circle like the head of a drum. In the half century Rinvius, professor at Liepzig, fancied he had discovered a hole in this membrane, surrounded by a sphincter, and affording a passage to the air, between the external and internal ear. Cowper, Heister, and some other anatomists, have admitted this supposed foramen, which certainly does not exist. Whenever there is any opening in the membrana tympani, it may be considered as accidental. Under the membrana tympani runs a branch of the fifth pair of nerves, called chorda tympani; and beyond this membrane is the cavity of the tympanum, which is about seven or eight lines wide, and half so many in depth; it is semicircular, and every where lined by a very fine membrane. There are four openings to be observed in this cavity. It communicates with the mouth by means of the Eustachian tube. This canal, which is in part bony and in part cartilaginous, begins by a very narrow opening at the anterior and almost superior part of the tympanum, increasing in size as it advances towards the palate of the mouth, where it terminates by an oval opening. This tube is every where lined by the same membrane that covers the inside of the mouth. The real use of this canal does not seem to have been hitherto satisfactorily ascertained; but found would seem to be conveyed through it to the membrana tympani, deaf persons being often observed to listen attentively with their mouths open. Opposite to this is a minute passage, which leads to the sinuosity of the mastoid process; and the other openings, which are in the internal process of the os petrosum, are the fenestra ovalis, and fenestra rotunda, both of which are covered by a very fine membrane.

There are three distinct bones in the cavity of the tympanum; and these are the malleus, incus, and stapes. Besides these there is a fourth, which is the os orbitolare, considered by some anatomists as a process of the stapes, which is necessarily broken off by the violence we are obliged to use in getting at these bones; but when accurately considered, it seems to be a distinct bone.

The malleus is supposed to resemble a hammer, being larger at one extremity, which is its head, than it is at the other, which is its handle. The latter is attached to the membrana tympani, and the head of the bone is articulated with the incus.

The incus, as it is called from its shape, though it seems to have less resemblance to an anvil than to one of the dente molares with its roots widely separated from each other, is distinguished into its body and its legs. One of its legs is placed at the entry of the canal which leads to the mastoid process; and the other, which is somewhat longer than the stapes, or rather with the os orbitolare, which is placed between them.

The third bone is very properly named stapes, being perfectly shaped like a stirrup. Its basis is fixed into the fenestra ovalis, and its upper part is articulated with the os orbitolare. What is called the fenestra rotunda, though perhaps improperly, as it is more oval than round, is observed a little above the other, in an eminence formed by the os petrosum, and is closed by a continuation of the membrane that lines the inner surface of the tympanum. The stapes and malleus are each of them furnished with a little nodule, the flape-deus and tenor tympani. The first of these, which is the smallest in the body, arises from a little cavern in the posterior and upper part of the cavity of the tympanum; and its tendon, after passing through a hole in the same cavern, is inserted at the back part of the head of the stapes. This nodule, by drawing the stapes obliquely upwards, affists in stretching the membrana tympani.

The tenor tympani (x), or internus mallei, as it is called by some writers, arises from the cartilaginous extremity of the Eustachian tube, and is inserted into the back part of the handle of the malleus, which it serves to pull inwards, and of course helps to stretch the membrana tympani.

The labyrinth is the only part of the ear which remains to be described. It is situated in the os petrosum, and is separated from the tympanum by a partition which is every where bony, except at the two fenestrae. It is composed of three parts; and these are the vestibulum, the semicircular canals, and the cochlea.

The vestibulum is an irregular cavity, much smaller than the tympanum, situated nearly in the centre of the os petrosum, between the tympanum, the cochlea, and the semicircular canals. It is open on the side of the tympanum by means of the fenestra ovalis, and communicates with the upper portion of the cochlea by an oblong foramen, which is under the fenestra ovalis, from which it is separated only by a very thin partition.

Each of the three semicircular canals forms about half

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(x) Some anatomists describe three muscles of the malleus; but only this one seems to deserve the name of muscle; what are called the externus and obliquus mallei, seeming to be ligaments rather than muscles.
ANATOMY

Part VI.

Of the senses.

Half a circle of nearly a line in diameter, and running in each a different direction, they are distinguished into vertical, oblique, and horizontal. These three canals open by both their extremities into the vestibulum; but the vertical and the oblique being united together at one of their extremities, there are only five orifices to be seen in the vestibulum.

The cochlea is a canal which takes a spiral course, not unlike the shell of a snail. From its base to its apex it makes two turns and a half; and is divided into two canals by a very thin lamina or septum, which is in part bony and in part membranous, in such a manner that these two canals only communicate with each other at the point. One of them opens into the vestibulum, and the other is covered by the membrane that cloths the fenestra rotunda. The bony lamella which separates the two canals is exceedingly thin, and fills about two thirds of the diameter of the canal.

The rest of the septum is composed of a most delicate membrane, which lines the whole inner face of the cochlea, and seems to form this division in the same manner as the two membranous bags of the pleura, by being applied to each other, form the mediastinum.

Every part of the labyrinth is furnished with a very delicate peritoneum, and filled with a watery fluid, destined as in other cavities. This fluid transmits to the nerves the vibrations it receives from the membrane cloing the fenestra rotunda, and from the bases of the flares, where it refils on the fenestrum ovale. When this fluid is collected in too great a quantity, or is compressed by the flares, it is fupposed to escape through two minute canals or aqueducts, lately described by Dr Coturni, an ingenious physician at Naples. One of these aqueducts opens into the bottom of the vestibulum, and the other into the cochlea, near the fenestra rotunda. They both pass through the os petrosum, and communicate with the cavity of the cranium where the fluid that paffes through them is absorbed; and they are lined by a membrane which is supposed to be a production of the dura mater.

The arteries of the external ear come from the temporal and other branches of the external carotid, and its veins pafs into the jugular. The internal ear receives branches of arteries from the basillary and carotids, and its veins empty themselves into the sinuses of the dura mater, and into the internal jugular.

The porroto dura of the seventh pair is distributed through the cochlea, the vestibulum, and the semicircular canals; and the porroto dura sends off a branch to the tympanum, and other branches to the external ear and parts near it.

The sense of hearing, in producing which all the parts we have described affift, is occasioned by a certain modulation of the air collected by the funnel-like shape of the external ear, and conveyed through the meatus auditivus to the membrana tympani. That sound is propagated by means of the air, is very easily proved by ringing a bell under the receiver of an air-pump; the sound affords being found to diminish gradually as the air becomes exhausted, till at length it ceases to be heard at all. Sound moves through the air with infinite velocity; but the degree of its motion seems to depend on the state of the air, as it constantly moves faster in a dense and dry, than in a moist and rarefied air.

That the air vibrating on the membrana tympani communicates its vibration to the different parts of the labyrinth, and by means of the fluid contained in this cavity affects the auditory nerve so as to produce sound, seems to be very probable; but the situation, the minuteness, and the variety of the parts which compose the ear, do not permit much to be advanced with certainty concerning their mode of action.

Some of these parts seem to constitute the immediate organ of hearing, and these are all the parts of the vestibulum; but there are others which seem intended for the perfection of this sense, without being absolutely essential to it. It has happened, for instance, that the membrana tympani, and the little bones of the ear, have been destroyed by disease, without depriving the patient of the sense of hearing.

Sound is more or less loud in proportion to the strength of the vibration; and the variety of sounds seems to depend on the difference of this vibration; for the more quick and frequent it is, the more acute will be the sound, and vice versa.

Before we conclude this article, it will be right to explain certain phenomena, which will be found to have a relation to the organ of hearing.

Every body has, in consequence of particular sounds, occasionally felt that disagreeable sensation which is usually called setting the teeth on edge: and the cause of this sensation may be traced to the communication which the porroto dura of the auditory nerve has with the branches of the fifth pair that are distributed to the teeth, being probably occasioned by the violent tremor produced in the membrana tympani by these very acute sounds. Upon the same principle we may explain the strong idea of sound which a person has who holds a vibrating string between his teeth.

The hummimg which is sometimes perceived in the ear, without any exterior cause, may be occasioned either by an increased action of the arteries in the ears, or by convulsive contractions of the muscles of the malleus and flares, affecting the auditory nerve in such a manner as to produce the idea of sound.

An ingenious philosophical writer has lately discovered, that there are sounds liable to be excited in the ear by irritation, and without any assistance from the vibrations of the air.

SECT. V. Of Vision.

The eyes which constitute the organ of vision are situated in two bony cavities named orbitae, where they are surrounded by several parts, which are either intended to protect them from external injury, or to affect their motion.

The

(y) This observation has led to a supposition, that a perforation of this membrane may in some cases of deafness be useful; and Mr Chefelden relates, that, some years ago, a malefactor was pardoned on condition that he should submit to this operation; but the public clamour raised against it was so great, that it was thought right not to perform it.
The globe of the eye is immediately covered by two eye-lids or palpebrae, which are composed of mucous fibres covered by the common integuments, and lined by a very fine and smooth membrane, which is from thence extended over the surface of the globe of the eye, and is called tunica conjunctiva. Each eye-lid is cartilaginous at its edge; and this border which is called tarso, is furnished with a row of hairs named cilia or eye-lashes.

The cilia serve to protect the eye from insects and minute bodies floating in the air, and likewise to moderate the action of the rays of light in their passage to the retina. At the roots of these hairs there are febaceous follicles, first noticed by Melibomius, which discharge a glutinous limiment. Sometimes the fluid they secrete has too much viscidity, and the eye-lids become glued to each other.

The upper border of the orbit is covered by the eye-brows or supercilia, which by means of their two muscles are capable of being brought towards each other, or of being carried upwards. They have been considered as serving to protect the eyes, but they are probably intended more for ornament than utility (2).

The orbits, in which the eyes are placed, are furnished with a good deal of fat, which affords a soft bed on which the eye performs its several motions. The inner angle of each orbit, or that part of it which is near the nose, is called canthus major, or the great angle; and the outer angle, which is on the opposite side of the eye, is the canthus minor, or little angle.

The little reddish body which we observe in the great angle of the eye-lids, and which is called caruncula lacrymalis, is supposed to be of a glandular structure, and, like the follicles of the eye-lids, to secrete an oily humour. But its structure and use do not seem to have been hitherto accurately determined. The surface of the eye is constantly moistened by a very fine limpid fluid called the tears, which is chiefly, and perhaps wholly, derived from a large gland of the conjon- 

The motions of the eye are performed by fix muscles; four of which are straight and two oblique. The straight muscles are distinguished by the name of elevator, depressor, adductor, and abductor, from their several uses in elevating and depressing the eye, drawing it towards the nose, or carrying it from the nose towards the temple. All these four muscles arise from the bottom of the orbit, and are inserted by flat tendons into the globe of the eye. The oblique muscles are intended for the more compound motions of the eye. The first of these muscles, the obliquus inferior, does not, like the other four muscles we have described, arise from the bottom of the orbit, but from the edge of the foramen that transmits the optic nerve, which separates the origin of this muscle from that of the others. From this beginning it passes in a straight line towards a very small cartilaginous ring, the situation of which is marked in the skeleton by a little hollow in the internal orbital proces of the os frontis. The tendon of the muscle, after passing through this ring, is inserted into the upper part of the globe of the eye, which it serves to draw forwards, at the same time turning the pupil downwards.

The obliquus inferior arises from the edge of the orbit, under the opening of the ductus lacrymalis; and is inserted somewhat posteriorly into the outer side of the globe, serving to draw the eye forwards and turn the pupil upwards. When either of these two muscles acts separately, the eye is moved on its axis; but when they act together, it is compressed both above and below. The eye itself, which is now to be described, with its tunics, humours, and component parts, is nearly of a spherical figure. Of its tunics, the conjunctiva has been already described as a partial covering, reflected from the inner surface of the eye-lids over the anterior portion of the eye. What has been named albuginea cannot properly be considered as a coat of the eye, being in fact nothing more than the tendons of the straight muscles spread over some parts of the fletorica.

The immediate tunics of the eye, which are to be demonstrated when its partial coverings, and all the other parts with which it is surrounded, are removed, are the fletorica, cornes, choroides, and retina.

The fletorica, which is the exterior coat, is every where

(2) It is observable, that the eye-brows are peculiar to the human species.

(a) It sometimes happens, that this pure, limid, fluid, which moistens the eye, being poured out through the excretory ducts of the lachrymal gland faster than it can be carried off through the puncta, trickles down the cheek, and is then strictly and properly called tears.

(b) When the ductus ad nares becomes obstructed in consequence of disease, the tears are no longer able to pass into the nostrils; the facculus lachrymalis becomes distended; and inflammation, and sometimes ulceration taking place, constitute the disease called fistula lacrymalis.
where white and opaque, and is joined at its anterior edge to another, which has more convexity than any other part of the globe, and being exceedingly transparent is called cornea (c). These two parts are perfectly different in their structure; so that some anatomists suppose them to be as distinct from each other as the glass of a watch is from the case into which it is fixed. The sclerotic is of a compact fibrous structure; the cornea, on the other hand, is composed of a great number of laminae united by cellular membrane. By macerating them in boiling water, they do not separate from each other, as some writers have asserted; but the cornea soon softens, and becomes of a glutinous nature.

The ancients supposed the sclerotic to be a continuation of the dura mater. Morgagni and some other modern writers are of the same opinion; but this point is disputed by Winlow, Haller, Zinn, and others. The truth seems to be, that the sclerotic, though not a production of the dura mater, adheres intimately to that membrane.

The choroides is so called because it is furnished with a great number of vessels. It has likewise been named uvea, on account of its resemblance to a grape. Many modern anatomical writers have conceived it as a production of the pia mater. This was likewise the opinion of the ancients; but the strength and thickness of the choroides, when compared with the delicate structure of the pia mater, are sufficient proofs of their being two distinct membranes.

The choroides has of late generally been described as consisting of two laminae; the innermost of which has been named after Ruyfch, who first described it. It is certain, however, that Ruyfch's division is ill founded, at least with respect to the human eye, in which we are unable to demonstrate any such structure, although the tunica choroides of sheep and some other quadrupeds may easily be separated into two layers.

The choroides adheres intimately to the sclerotic round the edge of the cornea; and at the place of this union, we may observe a little whitish areola, named ligamentum ciliare, though it is not of a ligamentous nature.

They who suppose the choroides to be composed of two laminae, describe the external one as terminating in the ligamentum ciliare, and the internal one as extending farther to form the iris, which is the circle we are able to distinguish through the cornea; but this part is of a very different structure from the choroides; so that some late writers have perhaps not improperly considered the iris as a distinct membrane. It derives its name from the variety of its colours, and is perforated in its middle. This perforation, which is called the pupil or sight of the eye, is closed in the focus by a very thin vascular membrane. This membrana pupillaris commonly disappears about the seventh month.

On the under side of the iris we observe many minute fibres, called ciliary processes, which pass in radii or parallel lines from the circumference to the centre. The contraction and dilatation of the pupil are supposed to depend on the action of these processes. Some have considered them as muscular, but they are not of an irritable nature; others have supposed them to be filaments of nerves: but their real structure has never yet been clearly ascertained.

Besides these ciliary processes, anatomists usually speak of the circular fibres of the iris, but no such seem to exist.

The posterior surface of the iris, the ciliary processes, and part of the tunica choroides, are covered by a black mucus for the purposes of accurate and distinct vision; but the manner in which it is secreted has not been determined.

Immediately under the tunica choroides we find the third and inner coat, called the retina, which seems to be merely an expansion of the pulpy substance of the optic nerve, extending to the border of the crystalline humour.

The greatest part of the globe of the eye, within these several tunics, is filled by a very transparent and gelatinous humour of considerable consistence, which, from its supposed resemblance to leaded glass, is called the vitreous humour. It is invested by a very fine and delicate membrane, called tunica vitrea, and sometimes arachnoides. It is supposed to be composed of two laminae; one of which dips into its substance, and by dividing the humour into cells adds to its firmness. The fore-part of the vitreous humour is a little hollowed, to receive a very white and transparent substance of a firm texture, and of a lenticular form, somewhat convex in shape, named the crystalline humour. It is included in a capsule, which seems to be formed by a separation of the two laminae of the tunica vitrea.

The fore-part of the eye is filled by a very thin and transparent fluid, named the aqueous humour, which occupies all the space between the crystalline and the prominent cornea. That part of the choroides which is called the iris, and which comes forward to form the pupil, appears to be suspended as it were in this humour, and has occasioned this portion of the eye to be distinguished into two parts. One of these, which is the little space between the anterior surface of the crystalline and the iris, is called the anterior chamber; and the other, which is the space between the iris and the cornea, is called the anterior chamber of the eye (b). Both these spaces are completely filled with the aqueous humour (a).

The eye receives its arteries from the internal carotid:

(c) Some writers, who have given the name of cornea to all this outer coat, have named what is here and most commonly called scleroticus, cornea opaca; and its anterior and transparent portion, cornea lucida.

(b) We are aware that some anatomists, particularly Lieutaud, are of opinion, that the iris is every where in close contact with the crystalline, and that it is of course right to speak only of one chamber of the eye; but as this does not appear to be the case, the situation of the iris and the two chambers of the eye are here described in the usual way.

(x) When the crystalline becomes opaque, so as to prevent the passage of the rays of light to the retina, it constitutes what is called a catactus; and the operation of couching consists in removing the disced crystalline from...
Anatomy. Part VI.

Of the Eye.

A young gentleman who was born blind, and who was
coached by Mr. Chefdelden, every object (as he ex-
pressed himself) seemed to touch his eyes as what he
felt did his skin; and he thought no objects so agree-
able as those which were smooth and regular, although
for some time he could form no judgment of their shape,
or guess what it was in any of them that was pleasing
to him.

In order to paint objects distinctly on the retina,
the cornea is required to have such a degree of con-
 convexity, that the rays of light may be collected at a
certain point, so as to terminate exactly on the retina.

If the cornea is too prominent, the rays, by diverging
too soon, will be reunited before they reach the retina,
as is the case with near-sighted people or myopes; and
on the contrary, if it is not sufficiently convex, the rays
will not be perfectly united when they reach the back
part of the eye; and this happens to long-sighted peo-
ple or presby, being found constantly to take place as
we approach to old age, when the eye gradually flat-
tens (r). These defects are to be supplied by means of
glasses. He who has too prominent an eye, will find
his vision improved by means of a conoe glafs; and
upon the same principles, a convex glafs will be found
useful to a person whose eye is naturally too flat.

Explanation

Figure 1. Shows the Lachrymal Canals, after the
Common Teguments and Bones have been cut away.

a, The lachrymal gland. b, The two puncta lachry-
malis, from which the two lachrymal canals pro-
ceed to c, The lachrymal sac. d, The large lachrymal
duct. e, Its opening into the nose. f, The caruncu-
la lachrymalis. g, The eye-ball.

Figure 2. An interior View of the Coats and Humours
of the Eye.

aaa, The tunica sclerotic cut in four angles, and
turned back. b b b, The tunica choroides adhering
to the inside of the sclerotic, and the ciliary vessels
are seen passing over.—c c, The retina which covers
the vitreous humour. d d, The ciliary processes, which
were continued from the choroid coat. e e, The iris.
f f, The pupil.

Figure 3. Shows the Optic Nerves, and Muscles of
the Eye.

a, a, The two optic nerves before they meet. b, The
two optic nerves conjointed. c, The right optic nerve.
d, Musculus attollens palpebrae superioris. e, Attoll-
ens oculi. f, Abdductor. g g, Obliquus superior, or
trochelearis. h, Adductor. i, The eye-ball.

Figure 4. Shows the Eye-ball with its Muscles.

a, The optic nerve. b, Musculus trochlearis. c, Part
of the os frontis, to which the trochlea or pully is fix-
d, through which—d, The tendons of the trochlearis
pass. e, Attollens oculi. f, Abdductor oculi. g, Ab-
ductor oculi. h, Obliquus inferior. i, Part of the

Superior maxillary bone to which it is fixed. k, The
eye-ball.

Figure 5. Represents the Nerves and Muscles of the
Right Eye, after part of the Bones of the orbit have
been cut away.

A, The eye-ball. B, The lachrymal gland. C, Mus-
culus abductor oculi. D, Attollens. E, Levator palpebrae superioris. F, Depreffer oculi. G, Adduc-
tor. H, Obliquus superior, with its pully. I, Its
insertion into the sclerotic coat. K, Part of the obli-
quus inferior. L, The anterior part of the os frontis
cut. M, The eriella galli of the ethmoid bone. N,
The posterior part of the sphenoid bone. O, Tran-
verse sphenous proces of the sphenoid bone. P, The
carotic artery, denuded where it passes through the
bones. Q, The carotic artery within the cranium.
R, The ocular artery.

Nerves.—a, The optic nerve. b, The third
pair. c, Its joining with a branch of the first branch
of the fifth pair, to form l, The lenticular ganglion,
which sends off the ciliary nerves. d, e e, The
fourth pair. f, The trunk of the fifth pair. g, The
first branch of the fifth pair, named ophthalamic.—
h, The frontal branch of it. i, Its ciliary branches,
along with which the nasal twig is sent to the nose.
k, Its branch to the lachrymal gland. l, The lenticu-
lar ganglion. m, The second branch of the fifth pair,
named superior maxillary. n, The third branch of the
fifth pair, named inferior maxillary. o, The sixth pair

from its bed in the vitreous humour. In this operation the corneas is perforated, and the aqueous humour escapes
out of the eye, but it is constantly renewed again in a very short time. The manner, however, in which it is
secreted, has not yet been determined.

(*) Upon this principle, they who in their youth are near-sighted may expect to see better as they advance
in life, as their eyes gradually become more flat.
Fig. 6. Represents the head of a youth, where the upper part of the cranium is laved off, to show the upper part of the brain, covered by the pia mater, the vessels of which are minutely filled with wax.


Fig. 7. Represents the parts of the External Ear, with the Parotid Gland and its Duct.

a a, The helix. b, The antihelix. c, The antitragus. d, The tragus. e, The lobe of the ear. f, The cavitas innominata. g, The scapha. h, The concha. i, I, The parotid gland. k, A lymphatic gland, which is often found before the tragus. l, The duct of the parotic gland. m, Its opening into the mouth.

Fig. 8. A view of the posterior part of the external ear, meatus auditus tympanum, with its small bones, and Eustachian tube of the right side.

a, The back part of the meatus, with the small ceruminous glands. b, The incus. c, Malleus. d, The chorda tympani. e, Membrana tympani. f, The Eustachian tube. g, Its mouth from the fauces.

Fig. 9. Represents the anterior part of the right external ear, the cavity of the tympanum—its small bones, cochlea, and semicircular canals.

a, The malleus. b, Incus with its long leg, resting upon the flapes. c, Membrana tympani. d, The Eustachian tube, covered by part of—f f, The mucusus circumflexus palatii. 1, 2, 3, The three semicircular canals. 4, The vestibule. 5, The cochlea. 6, The porus mamilis of the seventh pair of nerves.

Fig. 10. Shows the muscles which compose the fleshy substance of the Tongue.

a a, The tip of the tongue, with some of the papilae minarnae. b, The root of the tongue. c, Part of the membrane of the tongue, which covered the epiglottis. d d, Part of the mucusus hyo-glossus. e, The lingualis. f f, Genio-glossus. g g, Part of the stylo-glossus.

ANATOMY.
Anc

Anaximenes, the son of Aristocles of Lampacus an orator, the disciple of Diogenes the Cynic, and of Zelius the raider against Homer. He was preceptor to Alexander of Macedon, and followed him to the wars. Alexander being infatuated against the people of Lampacus, they sent this philosopher to Intercede for them. Alexander knowing the causé of his coming, swore that he would do the very reverse of whatever he desired of him. Anaximenes begged of him to destroy Lampacus. Alexander, unwilling to break his oath, and not able to elude this stratagem, pardoned Lampacus much against his will.

Anaximandrians, in the history of philosophy, the followers of Anaximander; the most ancient of the philosophical atheists, who admitted of no other substance in nature than matter.

Anazarbus (Pliny), Anazarbas (Stephanus); a town of Cilicia, on the river Pyramus, the birth place of Dioecesides, and of the poet Oppian. It was sometimes called Cæsarea, in honour either of Augustus or of Tiberius. The inhabitants are called Anazarbani (Pliny), and on coins Anazarrites, after the Greek idiom. It was destroyed by a dreadful earthquake in the year 535, along with several other important cities; but they were all repaired at a vast expense by the emperor Justin; who was so much affected with their misfortune, that, putting off the diadem and purple, he appeared for several days in sackcloth.

Anbertkend, in the eastern language, a celebrated book of the Brahmanas, wherein the Indian philosophy and religion are contained. The word in its literal sense denotes the cittern wherein is the water of life. The anbertkend is divided into 50 beth, or discourses, each of which consists of ten chapters. It has been translated from the original Indian into Arabic, under the title of Morat al Fahan, q. d. the marrow of intelligence.

Ancarano, a town of Italy, in the march of Ancona, situate in E. Long. 14° 54'. N. Lat. 42° 48'.

Ancaster, a town of Lincolnshire, situate in W. Long. 30°. N. Lat. 52° 30'. It gives title of duke to the noble family of Bertie.

Ancenis, a town of France, in the province of Brittany. W. Long. 1° 9'. N. Lat. 47° 20'.

Ancestors, those from whom a person is descended in a straight line. The word is derived from the Latin ancestor, contrived from antecessor, q. d. goer before.

Most nations have paid honours to their ancestors. It was properly the deputed fouls of their forefathers that the Romans worshipped under the denominations of raius, honour, and boeskold gods. Hence the ancient tombs were a kind of temples, or rather altars, wherein oblations were made by the kindred of the deceased.

The Russians have still their anniversary feasts in memory of their ancestors, which they call roditois fabet, q. d. kinship's jubilee, wherein they make formal visits to the dead in their graves, and carry them provisions, eatables, and presents of divers other kinds. They interrume them, with loud lamentable cries, What are they doing? How they spend their time? What it is they want? and the like.

The Orajes, a people of Africa, offer sacrifices of rice and wine to their ancestors before ever they undertake any considerable action. The anniversaries of their deaths are always kept by their families with great solemnity. The king invokes the soul of his father and mother to make trade flourish and the chaste succeed.

The Chinese seem to have distinguished themselves above all other nations in the veneration they bear to their ancestors. By the laws of Confucus, part of the duty which children owe to their parents consists in worshipping them when dead. This service, which makes a considerable part of the natural religion of the Chinese, is said to have been instituted by the emperor Kan, the fifth in order from the foundation of that ancient empire. Bibl. Un. tom. vii. The Chinese have both a solemn and ordinary worship which they pay to their ancestors. The former is held regularly twice a year, viz. in spring and autumn, with much pomp. A person who was present at it gives the following account of the ceremonies on that occasion: The sacrifices were made in a chapel well adorned, where there were fix altars furnished with centers, tapers, and flowers. There were three ministers, and behind them two young acolytes. The three former went with a profound silence, and frequent genuflexions, towards the five altars, pouring out wine: afterwards they drew near to the sixth, and when they came to the foot of the altar, half bowed down, they said their prayers with a low voice. That being finished, the three ministers went to the altar, the officiating priest took up a vessel full of wine, and drank; then he lifted up the head of a deer or goat; after which, taking fire from the altar, they all lighted a bit of paper, and the minister of the ceremonies turning towards the people, said with a high voice, that he gave them thanks in the name of their ancestors for having so well honoured them; and in recompence he promised them, on their part, a plentiful harvest, a fruitful illsue, good health, and long life, and all those advantages that are most pleasing to men.

The Chinese give their ancestors another simpler and more private worship. To this end they have in their houses a niche or hollow place, where they put the names of their deceased fathers, and make prayers and offerings of perfumes and spices to them at certain times, with bowing, &c. They do the like at their tombs.

The Jews settled in China are said to worship their ancestors like the heathens, and with the same ceremonies, except that they offer not swine's flesh. Near their synagogue they have a hall, or court of ancestors, wherein are niches for Abraham, Isaac, &c. The Jews also confirnmed, and were permitted by their general
ANCHILOPS, or, in medicine, denotes an abscess, or collection or matter, between the great angle of the eye and the nose. If suffering to remain too long, or unskilfully managed, it degenerates, the flagrating humours corrupt, and the tears flow involuntarily, whilst the os lachrymale is not carious, it is an *aglopis*; but when the ulcer is of a long standing, deep, festish, and the os lachrymale becomes carious, it is a *fellinus*. The cure is by restriction and excision, tying it at the root on the glandula lachrymatis, and, when ready, cutting it off. 

ANCHISES, in fabulous history, a Trojan prince, descended from Dardanus, and the son of Capys. Venus made love to him in the form of a beautiful nymph; and bore him *Anaes*, the hero of Virgil's *Aeneid*.

ANCHOR (ancora, Lat. from αγκόρα, Greek), a heavy, strong, crooked instrument of iron, dropped from a ship into the bottom of the water, to retain her in a convenient station in a harbour, road, or river.

The most ancient anchors are said to have been of stone; and sometimes of wood, to which a great quantity of lead was usually fixed. In some places, bales full of stones, and stakes filled with sand, were employed for the same use. All these were let down by cords into the sea, and by their weight stayed the course of the ship. Afterwards they were composed of iron, and furnished with teeth, which, being fastened to the bottom of the sea, preserved the vessel immovable; whence *discrevix* and *denter* are frequently taken for anchors in the Greek and Latin poets. At first there was only one tooth, whence anchors were called *monotere*; but in a short time the second was added by Eupalamus, or Anacharis, the Scythian philosopher. The anchors with two teeth were called *biferei* or *biferei*, and from ancient monuments appear to have been much the same with those used in our days, only the transverse piece of wood upon their handles (the *flock*) is wanting in all of them. Every ship had several anchors; one of which, surpassing all the rest in bigness and strength, was peculiarly termed *sacra*, and was never used but in extreme danger; whence *sacrum anchoras sacrum* is proverbially applied to such as are forced to their last refuge.

The anchors now made are contrived so as to sink into the ground as soon as they reach it, and to hold a great strain before they can be loosened or dislodged from their station. They are composed of shank, a flock, a ring, and two arms with their flukes. The flock, which is a long piece of timber fixed across the shank, serves to guide the flukes in a direction perpendicular to the surface of the ground; so that one of them sinks into it by its own weight as soon as it falls, and is still preferred steadily in that position by the flock, which together with the shank, lies flat on the bottom. In this situation it must necessarily sustain a great effort before it can be dragged through the earth horizontally. Indeed this can only be effected by the violence of the wind or tide, or both of them, sometimes increased by the turbulence of the seas, and acting upon the ship so as to stretch the cable to its utmost tension, which accordingly may dislodge the anchor from its bed, especially if the ground be soft and oozy, or rocky. When the anchor is thus displaced, it is said, in the Greek phrase, *to come home*.

That the figure of this useful instrument may be more clearly understood, let us suppose a long nailed beam of iron erected perpendicularly, $h$, at the lower end of which are two arms, $a, e$, of equal thickness with the beam (usually called the *shank*) only that they taper towards the points, which are elevated above the horizontal plane at an angle of 30 degrees, or inclined to the shank at an angle of 60 degrees; on the upper part of each arm, (in this position) is a fluke or thick plate of iron, $g, h$, commonly shaped like an idiole triangle whose base reaches to the middle of the arm. On the upper end of the shank is fixed the flock transversely with the flukes; the flock is a long beam of oak, $f$, in two parts, strongly bolted, and hooped together with iron rings. See also No. 2. Closer above the shank is the ring $k$, to which the cable is fastened, or bent; the ring is curiously covered with a number of pieces of short rope, which are twisted about it so as to form a very thick texture or covering called the *pudding*, and used to prefer the cable from being fretted or chafed by the iron.

Every ship has, or ought to have, three principal anchors, with a cable to each, viz. the *flet*, *maillotte*, *sacra*, (which is the *ancora sacra* of the ancients); the beft bowe, *second anor*; and small bowe, *ancor d'affarche*, so called from their usual situation on the ship's bows. There are besides smaller anchors, for removing a ship from place to place in a harbour or river, where there may not be room or wind for sailing; these are the stream-anchor, *ancor de toue*; the kedge, and grappling, *grapine*; this last, however, is chiefly designed for boats.

**Method of Making Anchors.** The good use of the anchor is a point of great importance. Great care is therefore to be taken, that the metal it is made of be neither too soft nor too brittle; the latter rendering it liable to break and the former to strain.

The shank, arms, and flukes, are first forged separately; then the hole is made at one end of the shank for the ring, which being also previously forged, is
ANCHOR

Anchor. put into the hole of the shank, and the two ends shut together. After which the arms are shut to the shank one after the other, and the anchor is finished.

Proof is made of anchors, by raising them to a great height, and then letting them fall again on a kind of iron block placed across for the purpose. To try whether the flukes will turn to the bottom and take hold of the ground, they place the anchor on an even surface, with the end of one of the flukes, and one of the ends of the stock resting on the surface; in case the anchor turns, and the point of the fluke rises upwards, the anchor is good.

In England, France, and Holland, anchors are made of forged iron; but in Spain they are sometimes made of copper, and likewise in several parts of the South-Sea.

For the proportions of anchors, according to Man-waring, the shank is to be twice the length of one of the flukes, and half the length of the beam. According to Aubin, the length of the anchor is to be four tenths of the greatest breadth of the ship; so that the shank, e. gr. of an anchor in a vessel 30 feet wide, is to be 12 feet long. When the shank is, for instance, eight feet long, the two arms are to be seven feet long, measuring them according to their curvature. As to the degree of curvature given the arms, there is no rule for it; the workmen are here left to their own discretion.

The latter writer observes, that the anchor of a large heavy vessel is smaller, in proportion, than that of a lighter one. The reason he gives is, that though the sea employs an equal force against a small vessel as against a great one, supposing the extent of wood upon which the water acts to be equal in both, yet the little vessel, by reason of its superior lightness, does not make so much resistance as the greater; the defect whereof must be supplied by the weight of the shank.

From these, and other hydrostatic principles, the following table has been formed; wherein is shown, by means of the ship's breadth within, how many feet the beam or shank ought to be long, giving it four-tenths or two-fifths of the ship's breadth within: by which proportion might be regulated the length of the other parts of the anchor. In this table is represented likewise the weight an anchor ought to be for a ship from eight feet broad to 45, increasing by one foot's breadth; supposing that all anchors are similar, or that their weights are as the cubes of the lengths of the shanks.

<table>
<thead>
<tr>
<th>Feet.</th>
<th>Feet.</th>
<th>Pounds.</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>3\frac{1}{2}</td>
<td>33</td>
</tr>
<tr>
<td>9</td>
<td>3\frac{1}{2}</td>
<td>47</td>
</tr>
<tr>
<td>10</td>
<td>4</td>
<td>64</td>
</tr>
<tr>
<td>11</td>
<td>4\frac{1}{2}</td>
<td>84</td>
</tr>
<tr>
<td>12</td>
<td>5</td>
<td>110</td>
</tr>
<tr>
<td>13</td>
<td>5\frac{1}{2}</td>
<td>140</td>
</tr>
<tr>
<td>14</td>
<td>6</td>
<td>175</td>
</tr>
<tr>
<td>15</td>
<td>6\frac{1}{2}</td>
<td>216</td>
</tr>
<tr>
<td>16</td>
<td>7</td>
<td>262</td>
</tr>
<tr>
<td>17</td>
<td>7\frac{1}{2}</td>
<td>314</td>
</tr>
<tr>
<td>18</td>
<td>8</td>
<td>373</td>
</tr>
<tr>
<td>19</td>
<td>8\frac{1}{2}</td>
<td>439</td>
</tr>
<tr>
<td>20</td>
<td>9</td>
<td>512</td>
</tr>
<tr>
<td>21</td>
<td>9\frac{1}{2}</td>
<td>592</td>
</tr>
</tbody>
</table>

M. Bouguer, in his Traité de Navire, directs to take the length of the shank in inches, and to divide the cube of it by 1160 for the weight. The reason is obvious; because the quotient of the cube of 20\frac{1}{2} inches, which is the length of an anchor weighing 7000 lb., divided by the weight, is 1160; and therefore, by the rule of three, this will be a common divisor for the cube of any length, and a single operation will suffice.

The same author gives the following dimensions of the several parts of an anchor. The two arms generally form the arch of a circle, whose centre is three-eighths of the shank from the vertex, or point where it is fixed to the shank; and each arm is equal to the same length, or the radius; so that the two arms together make an arch of 180 degrees: the flukes are half the length of the arms, and their breadth two-fifths of the said length. With respect to the thickness, the circumference at the throat, or vertex of the shank, is generally made about the fifth part of its length, and the small end two-thirds of the throat; the small end of the arms of the flukes, three-fourths of the circumference of the shank at the throat. These dimensions should be bigger, when the iron is of a bad quality, especially if cast iron is used instead of forged iron.

At Anchor, the situation of a ship which rides by her anchor in a road or haven, &c. Plate XXXI. fig. 1. No 3, represents the fore part of a ship as riding in this situation. See also Buoy-Rope.

To Fish the Anchor, to draw up the flukes upon the ship's side after it is catted. See the articles DAVIT and Fish.

To Fish the Ship to her Anchor, is to steer the ship's head towards the place where the anchor lies when they are heaving the cable into the ship; that the cable may thereby enter the haufe with less resistance, and the ship advance towards the anchor with greater facility.
ANCHOR-GROUND is a bottom which is neither too deep, too hollow, nor rocky; as in the first the cable bears too nearly perpendicular, and is thereby apt to jerk the anchor out of the ground; in the second, the ship's bottom is apt to strike at low water, or when the sea runs high, by which she is exposed to the danger of sinking; and in the third, the anchor is liable to hook the broken and pointed ends of rocks, and tear away its flukes, whilst the cable, from the same cause, is constantly in danger of being cut through as it rubs on their edges.

ANCHORS, in architecture, is a sort of carving, somewhat resembling an anchor. It is commonly placed as part of the enrichments of the boultings of capitals of the Tuscan, Doric, and Ionic orders, and also of the boultings of bed-mouldings of the Doric, Ionic, and Corinthian cornices, anchors and eggs being carved alternately through the whole building.

ANCHORS, in heraldry, are emblems of hope, and are taken for such in a spiritual as well as a temporal sense.

ANCHORAGE, in law, is a duty upon ships for the use of the port or harbour where they cast anchor.

ANCHOVY, in ichthyology, the English name of the clupea encrasicolus. See CLUPEA.

ANCHOVY-PEAR. See GRIAS.

ANCHUSA. ALKANET or BUGLOSS: A genus of the monogynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 44th order, ephemcrifolae. The calyx is a quinquepartite perianthium, oblong and perifent: The corolla is monopetalous and funnel-shaped, the throat closed with scales: The flamina consist of five short filaments: the antheräe oblong and covered: The pistillum has four germina, a filiform stylum, and obtuse stigma: There is no pericarpium, the calyx containing the seeds in its bolum: The seeds are four, oblong, gibbosus, and engraven at the base.

Species. 1. The officinalis, or greater garden-bugloss, is a native of France and of the warmer parts of Europe, but will thrive well enough in the climate of Britain; though the roots seldom continue longer than two years there, unless they happen to grow in rubbish, or out of an old wall, where they will live three or four years.

2. The anguilfolia, or perennial wild bugloss, grows to the height of two feet when cultivated in gardens; but in those places where it grows wild is seldom more than a foot and a half high. The leaves of this sort are narrow; the spikes of flowers come out double, and have no leaves about them; the flowers are small, and of a red colour. The roots will continue two years in a poor soil.

3. The undulata, or Portugal bugloss, is a biennial plant, which grows to the height of two feet, and sends out many lateral branches. The flowers are of a bright blue colour, and grow in an imbricated spike.

4. The orientalis, or eastern bugloss, is a native of the Levant. It is a perennial plant, with long trailing branches which lie on the ground. The flowers are yellow, and about the size of the common bugloss, and there is a succession of these on the same plants great part of the year.

5. The virginiana, or punctoon, grows naturally in the woods of North-America; and being an early plant, generally flowers before the new leaves come out on the trees; so that in some woods where it abounds, the ground seems entirely covered with its yellow flowers. It is a perennial plant, which seldom rises a foot high in good ground, but not above half that height where the soil is poor. The flowers grow in loose spikes upon smooth stalks. 6. The sempervirens, or ever-green borage, is a very hardy perennial plant, with weak trailing branches. It grows naturally in some parts of Britain and Spain. The flowers are blue, and come out between the leaves on the spike, like the fourth sort. They appear during a great part of the year.

7. The cirtica, or warted bugloss of Crete, is a low trailing annual plant, whose branches seldom extend more than six inches. The flowers are small, of a bright blue colour, and are collected into small bunches at the extremity of the branches. The plants perish soon after their seeds are ripe.

8. The tinctoria, or true alkanet, grows naturally in the Levant, but is equally hardy with the first species. The flowers grow in long spikes, coming out imbricate, like the tiles of a house.

Culture. All the species of anchusa may be propagated by seeds; which should be sown, either in the spring or autumn, upon a bed of light sandy earth; and when the plants are strong enough to be removed, they must be planted on beds at two feet distance from another, and watered, if the season requires it, till they have taken root; after which they will require no other care than to keep them free from weeds.

Medicinal Uses, &c. The flowers of the first species have obtained the name of cordial flowers; to which they have no other title than that they moderately cool and soften, without offending, the palate or stomach; and thus, in warm climates, or in hot diseases, may in some measure refresh the patient. The root of the tinctoria is likewise used, not as pounded of any medicinal virtue, but on account of its imparting an elegant red colour to oily substances; so is frequently directed as a colouring ingredient for ointments, plasters, &c.

As the colour is confined to the cortical part, the small roots are to be preferred, as having proportionally more bark than the large ones. The alkanet root which grows in England is greatly inferior to what comes from France, and some other parts of Europe.

ANCHYLOBLEPHARON. See ANKYLOBLEPHARON.

ANCHYLOSIS. See ANKYLOSIS.

ANCESTORS, or Antient, a term applied to things which exist long ago; thus we say, ancient nations, ancient customs, &c. See Antiqities.

ANCIENT, sometimes denotes elderly, or of the same age as by nations, military.

ANCIENT, in a military sense, denotes either the enigma or colours.

ANCIENT, in ships of war, the stamper or flag borne in the stern.

ANCIENT, or Antient. See Anchusa.

ANCIENTLY. See Anchusa.

ANCIENTLY. See Anchusa.

ANCIENTLY. See Anchusa.

ANCIENTLY. See Anchusa.

ANCIENTLY. See Anchusa.

ANCIENTLY. See Anchusa.
ANCIENT, in some ancient statutes, is used for concerning Traditions is fully
ANCILLON (David), a minister of the reformed markable for its excellent
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ANC

Ancones

15. 5. N. Lat. 43° 36'.

Ancones, in architecture, the corners or quoin

of walls, cross-beams, or rafters.—Vitruvius calls the

corners the same name.

ANCONY, in the iron-works, a piece of half-

wrought iron, of about three quarters of 100 weight,

and of the shape of a bar in the middle, but rude and

unwrought at the ends. The process for bringing the

iron to this state is this: They first melt off a piece

from a few of cast iron, of the proper size; these

they hammer at the forge into a mass of two feet long,

and of square shape, which they call a bloom; when this

is done, they send it to the foundry, where, after two or

three heats and workings, they bring it to this figure,

called an ancony. The middle part being out at the

foundry, is about three feet long, and of the shape and

thickness the whole is to be; this is then sent to the

chafery, and there the ends are wrought to the shape

of the middle, and the whole made into a bar. See

Bar.

ANCORARUM URBIS, Ancyren Polis, a city in

the Nomos Aphroditoepolitos, towards the Red Sea;

so called because there was in the neighbourhood a stone

quarry, in which they hewed stone anchors (Pio-

lemo), before iron anchors came to be used. The gen-

tilious name is Ancyropolis, (Stephanus).

ANCOURT (Florent-Carton'd), an eminent French

actor and dramatic writer, born at Pontoise, Octo-

ber 1661. He studied in the Jesuit's college at

Paris, under father de la Rue; who, discovering in him a re-

markable vivacity and capacity for learning, was ex-

tremely desirous of engaging him in their order; but

Ancourt's aversion to a religious life rendered all his

efforts ineffectual. After he had gone through a course

of philosophy, he applied himself to the civil law, and

was admitted advocate at 17 years of age. But falling

in love with an actress, he was induced to go upon the

stage, and he married her. As he had all the qualifi-
cations necessary for the theatre, he soon greatly distin-
guished himself: and not being satisfied with the ap-

plause only of an actor, he began to write pieces for the

stage; many of which had such prodigious success, that

most of the players grew rich from the profits of

them. His merit in this way procured him a very fa-

vourable reception at court; and Lewis XIV. show-

ed him many marks of his favour. His sprightly conver-
sation and polite behaviour made his company agreeable
to all the men of figure both at court and in the city and
the most considerate persons were extremely plea-

ted to have him at their houses. Having taken a jour-

ney to Dunkirk, to see his eldest daughter who lived

there, he took the opportunity of paying his compli-

ments to the elector of Bavaria, who was then at Brus-

seis: this prince received him with the utmost civility;

and having detained him a considerable time, dismissed

him with a present of a diamond valued at 1000 pi-

stoles: he likewise rewarded him in a very generous

manner, when, upon his coming to Paris, Ancourt com-
poused an entertainment for his diversion. Ancourt be-

gan at length to grow weary of the theatre, which he

quitted in Lent 1718, and retired to his estate of Cour-

cellesie Roy, in Berry, where he applied himself whol-

ly to devotion, and composed a translation of David's

Prums in verse, and a sacred tragedy, which were ne-

ver printed. He died the 6th of December, 1726, be-

ing 65 years of age.—The plays which he wrote are

52 in all; most of which were printed separately at the

time when they were first represented; they were after-

wards collected into five volumes, then into seven, and

at last nine. This last edition is the most complete.

ANCRE, a small town of France, in Picardy, with

the title of a marquisate, seated on a little river of the

same name. E. Long. 2. 45. N. Lat. 49° 59'.

ANCUS MARTIUS, the fourth king of the Ro-

mans, succeeded by Tullius Hostilius, 629 years before

Christ. He defeated the Latins, subdued the Rude-

nates, conquered the Sabines, Volscii, and Venetines,

enlarged Rome by joining it to Mount Janicula, and

made the harbour of Ostia. He died about 615 years

before the Christian era.

ANCY, in antiquity, a kind of shield that fell,
as was pretended, from heaven, in the reign of Numa

Pompilius; at which time, likewise, a voice was heard

declaring that Rome should be mistress of the world as

long as she should preserve this holy buckler. It was

kept with great care in the temple of Mars, under the

direction of twelve priests; and least any should attempt
to steal it, eleven others were made so like, as not to

be distinguished from the sacred one. These ancylia

were carried in procession every year round the city of

Rome.

ANCY, in surgery. See Ancylosis.

ANCYLOBARON, (from ανκυλος an eye-lid), a disea-
s of the eye, which cloes the eye-lids. Sometimes the eye-
lids grow together, and also to the uncina albiguine of

eye, which comes from carelessness when there is an ulcer in these parts.

Both these cases are called ancylobaros by the

Greeks. This disorder must be distinguished from that

coalition of the eye-lids which happens from vitio­
matter gluing them together. If the cohesion is on the

cornea, the sight is inevitably lost. This hath some-
times happened in the small-who. If there is only a

growing together of the eye-lids, they into two, and are

separated by the spectacle, and pledges kept between them to

prevent their re-union. If the eye-lids adhere to the

eye, they are to be separated by a fine-edged knife;

and their re-union is to be prevented by a proper use of

injections, and lint placed between them, after dipping

it in some proper liniment.

ANCYLOGLOSSUM, (from ανκυλος crooked and

γλωσσα the tongue); a contraction of the ligaments

of the tongue. Some have this imperfection from their

birth, others from some disease. In the first case, the

membrane which supports the tongue is too short or

too hard; in the latter, an ulcer under the tongue, heal-

ing and forming a cicatrix, is sometimes the cause:

These speak with some difficulty. The ancyloglossus

by nature are late before they speak; but when they

begin, they soon speak properly. These we call tongu-

tied. Maricanius says, that in this case it is a small mem-

branous production, which extends from the frenulum

to the tip of the tongue, that hinders the child from

fucking, &c. He justly condemns the cruel practice

among nurses, of tearing this membrane with their

nails; for thus ulcers are sometimes formed, which are

of
of difficult cure: he advises to slip it with cæcils in
ferum on the coast of Siam. They are but little known;
two or three places, taking care not to extend the
only the East India ships sometimes touch at them, and
points of the cæcils so far as the frænum. The in-
are supplied by the natives with rice, herbs, and fruits:
stances rarely occur which require any kind of allia-
the inhabitants are by some represented as a harmless
scape: for if the child can thrall the tip of its tongue
to the outer edge of its lip, this diseafed does not exist;
and if the tongue is not greatly refrained, the frænu-
and crying.
Ancylosis, in surgery, implies a distortion or stiftenes-
sum. It is separated by the
these in the region of the
of the
and therefore remedies of a mollifying and relaxing nature are re-
ancyra, the capital of Galatia, (Livy, Pliny, Ptolemy); at no great distance from the river Halys,
ness in the jowels, or by the
is the
Benadur and Lau Mancha on the north; the kingdom of Granada, the straits of Gibra-
In the 9th of queen Elizabeth, he was both lent and summer reader, and in the
Ancyra, the capital of Galatia, (Livy,
Ancystra, in botany: A genus of the digynia-
keeps a good number of
is situated in a plain on the

Ancyro, or Ancyra, a city of Cologne, in the circle

ANCYRA, (Livy); Ancyra, (Pliny); Ancyra,

ANCYSTRUM, in botany: A genus of the digynia-

ANCYCAVI, (Tacitus); Anegavi, (Pliny); Andes, (Cesar); Andes, (Lucan): A people of Gal-

ANCYCAVI, or Andegavus, a town of Gallia

ANDALUSIA, the most westerly province of

ANDALUSIA, a division of the province of Tera

ANDALUSIA, a division of the province of Tera

ANDARENA, a city of Cologne, in the circle of the

ANDERAB, the most southern city of the pro-

ANDERMAN, or Andeman Islands, in the East

ANDERMAN, or Andeman Islands, in the East

ANDARENA, (Sir Edw.) a younger son of an

ANDERMAN, or Andeman Islands, in the East

ANDERMAN, or Andeman Islands, situated about 80 leagues distance from Tana-
Andrefon. was made lord chief justice of the common pleas, and
in the year following was knighted. He held his of-
file to the end of his life, died in the year 1605, and
was buried at Ewythor in Bed fordshire. He was an
able, but punctilious lawyer, a founce to the Pur-
tans; and a feneuous supporter of the ftablifhed
church. His works are, 1, Reports of many prin-
cipal cases argued and adjudged in the time of queen
Elizabetb, in the common bench. Lond. 1644, fol.
2. Resolutions and judgments on the cases and matters
agitated in all the courts of Welfminifter, in the latter
end of the reign of queen Elizabeth. Published by
John Goldborough, Efq; Lond. 1673, 4to. Beside:
there, is a manuscript copy of his Readings still in
being.

Anderson (Adam), a native of Scotland, was
brother to the reverend James Anderson, D. D. editor
of the Diplomata Scotiae and Royal Genealogies, many
years fince minifter of the Scots prebyterian church
in Swallow-street, Piccadilly, and well known in those
days among the people of that persuasion resident in
London, by the name of Bishop Anderson, a learned
but imprudent man, who left a confiderable part of his
property in the fatal year 1720. He married, and had
fiiue a fon, and a daughter, who was the wife of an
officer in the army.

Adam Anderson was for 40 years a clerk in the
South Sea Houfe; and at length arrived to his acmé
there, being appointed chief clerk of the Stock and
New Annuities, which office he retained till his death.
He was appointed one of the traffees for ftabilifying
the colony of Georgia, in America; and was also one
of the court of affiliates of the Scots corporation in
London. The time of the publication of his "His-
torical and Chronological Deduction of Trade and
Commerce," a work replete with useful information,
was about the year 1762. He was twice married;
by the firft wife he had fiiue a daughter, married to
one Mr Hardy, an apothecary in the Strand, who are
both dead without fiiue; he afterwards became the
third husband of the widow of Mr Coulter, formerly
a wholefafe linen-draper in Cornhill, by whom he
had no fiiue. She was, like him, tall and graceful;
and her face has been thought to have borne resem-
blance to that of the ever-living countefs of Defmond,
given in Mr Pennant's firft Tour in Scotland. Mr An-
derfon died at his house in Red Lion-street, Clerken-
well, January 10, 1775. He had a good library of
books, which were fold by his widow, who survived
him feveral years, and died in 1791.

Andes, a great chain of mountains in South Ame-
rica, which, running from the moft northern part of
Peru to the Straits of Magellan, between 3 and 4000
miles, are the longest and moft remarkable in the
world. The Spaniards call them the Cordillera de los
Andes; they form two ridges, the lower moft of which
is overfpread with woods and groves, and the upper-
moft covered with everlafting snow. Thofe who have
been at the top, affirm, that the fky is always fenere
and bright; the air cold and piercing; and yet fo thin,
that they were fcarce able to breathe, and the respiration
was much thicker than ordinary; and this is attended
with reaching and vomiting; which, however, has
been confidered by fome as merely accidental. When
they looked downwards, the country was hid by the
clouds that hovered on the mountain's fides. The
mountains juft mentioned, which have been frequently
afcended, are much inferior in height to many others
in this enormous chain. The following is the account
given of the mountain called Pichincha, by the mathe-
maticians fent by the kings of France and Spain to
make obervations in relation to the figure of the earth.

Soon after our artists arrived at Quito, they deter-
dined to continue the feries of the triangles for mea-
suring an arch of the meridian to the S. of that city;
the company accordingly divided themselves into two
bodies, consisting of French and Spaniards, and each
retired to the part assigned them. Don George Juan
and M. Godin, who were at the head of one party,
gl went to the mountain of Pambamarca, while M.
Bougur, de la Condamin, and Don Ulloa, together
with their affiliates, climbed up to the highest summit
of Pichincha. Both parties fuffered extremely, as
well from the feverity of the cold as from the impe-
tuality of the winds, which on their heights blow
with incessant violence; difficulties the more painful,
as they had been little used to fuch fentations. Thus,
in the torrid zone, nearly under the equinoctial, where
it is natural to fuppofe they had moft to fear from the
heat, their greateft pain was caufed by the excefive-
nefs of the cold.

Their firft fcheme for felter and lodging in these
uncomfortable regions, was to pitch a field-tent for
each company; but on Pichincha this could not be
done from the narrownefs of the fummit: they were
therefore obliged to be contented with a hut fo small
that they could hardly all creep into it. Nor will this
appear strange, if the reader confiders the bad difpo-
sion and smallnefs of the place, it being one of the
loftift crags of a rocky mountain, 100 fathoms above
the highest part of the defart of Pichincha. Such
was the situation of their manifon, which, like all the
other adjacent parts, soon became covered with ice and
snow. The acent up this stupendous rock from the
base, or the place where the mules could come, to
their habitation, was fo craggy as only to be climbed
on foot; and to perform it cost them four hours con-
tinuous labour and pain, from the violent efforts of the
body, and the infubility of the air; the latter being fuch
as to render respiration difficult.

The strange manner of living to which our artists
were reduced during the time they were employed in
a geometrical menfuration of fome degrees of the me-
ridian, may not perhaps prove unentertaining to the
reader; and therefore the following account is given
as a fpecimen of it. The defart of Pichincha, both
with regard to the operations performed there and its
inconveniences, differing very little from others, an
idea may be very eafily formed of the fatigues, hard-
ships, and dangers, to which they were continually
exposed during the time they were prosecuting the en-
terprise, with the conduct of which they had been ho-
oured. The principal difference between the feveral
defarts confifted in their greater or leffer distance
from places where they could procure provisions; and
in the inclemency of the weather, which was propor-
tionate to the height of the mountains, and the fefion
of the year.

They generally kept within their hut. Indeed they
were obliged to do this, both on account of the in-
G P tendency
The tenors of the cold, the violence of the wind, and
their being continually involved in so thick a fog, that
an object at six or eight paces was hardly discernible.
When the fog cleared up, the clouds by their gravity
moved nearer to the surface of the earth, and on all
sides surrounded the mountains to a vast distance, rep-
resenting the sea, with their rock like an island in the
centre of it. When this happened they heard the
horrid noises of the tempests, which then discharged
themselves on Quito and the neighbouring country.
They saw the lightnings issue from the clouds, and
heard the thunders roll far beneath them: and whilst
the lower parts were involved in tempests of thunder
and rain, they enjoyed a delightful serenity; the wind
blows; their lips swelled, the sun moderated the severity
of the cold. But their frequently they were obliged to
rise: their thickness rendered respiration difficult; the
lips, it produced such
snow and hail fell continually; and the wind returned
with all its violence; so that it was impossible entire-
ly to overcome the fears of being, together with their
hut, blown down the precipice, on whose edge it was
frequently

Their common food in this inhospitable region was
a little rice boiled with some fliess or fowl, procured from
Quito; and, instead of fluid water, their pot was fill-
ed with ice; they had the fame reliance with regard
to what they drank; and while they were eating, ev-
evry one was obliged to keep his plate over a chafing-
dish of coals, to prevent his provisions from freezing.
The fame was done with regard to the water. At first
they imagined the drinking strong liquors would dif-
fuse a heat through the body, and consequently ren-
der it less sensible of the painful sharpness of the cold;
but, to their surprize, they felt no manner of
strength in such liquors, nor were they any greater preservative
against the cold than the common water.

The days were
The nights were
Their

Though their

but their.

They were not indeed without servants and Indians; but these were so
bemused with the cold, that it was with great diffi-
culty they could get them out of a small tent, where
they kept a continual fire. So that all our artists could
obtain from them was to take their turns in this la-
bour; and even then they went very unwillingly about
it, and consequently performed it very slowly.

It may easily be conceived what this company suf-
fered from the aperities of such a climate. Their feet
were swelled; and so tender, that they could not even
bear the heat; and walking was attended with extra-
geme.

Their hands were covered with chil-
blains; their lips swelled and chopped; so that every
motion in speaking, or the like, drew the blood; con-
sequently they were obliged to strict taciturnity, and
little disposed to laugh, as, by causing a diffusion of
the lips, it produced such
fich figures as were very painful for two or three days after.

At the same time they found it impossible to keep
the Indians together. On their first feeling of the climate,
their thoughts were immediately turned on dei-
serting their matters. The first instance they had of
this kind was so unexpected, that, had not one, of a
better disposition than the rest, flied and acquainted
them of their design, it might have proved of very bad
consequence. The affair was this: There being on the
top of the rock no room for pitching a tent for the In-
dians, they used every evening to retire to a cave at
the foot of the mountain; where, beside a natural diminu-
tion of the cold, they could keep a continual fire; and,
consequently enjoyed more comfortable quarters than
their matters. But when the hut 

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the cloth of leather, and on the inside not the
final crevice was left unchopped: beside which, it was
very compactly covered with straw: but, notwithstanding
all their care, the wind penetrated through.
The days were often little better than the nights; and
all the light they enjoyed was that of a lamp or two,
which they kept continually burning.

Though their hut was small, and crowded with in-
habitants, beside the heat of the lamps; yet the
tenor's of the cold was such, that every one of them
was obliged to have a chafing dish of coals. These pre-
cautions would have rendered the rigour of the climate
supportable, had not the imminent danger of perishing
by being blown down the precipice roused them, every
time it snowed, to encounter the severity of the out-
ward air, and to rally out with shovels to free the roof of
their hut from the masses of snow which were gathering
on it. Nor would it, without this precaution, have
been able to support the weight. They were not in-
der times{4272}

As soon as the snow was cleared away
from

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the door, they dispatched the Indian to the corregidor of Quito, who with equal dispatch sent other Indians, threatening to chastise them severely if they were wanting in their duty.

But the fear of punishment was not sufficient to induce them to support the rigour of this situation; for within two days they departed. The corregidor therefore, to prevent any other inconvenience, sent four Indians under the care of an alcalde, and gave orders for their being relieved every fourth day.

Twenty-three tedious days our artists spent on this rock, viz. to the 6th of September, and even without any possibility of finishing their observations of the angles: for when it was fair and clear weather with them, the others, on whose summits the signals which formed the triangles for measuring the degrees of the meridian, were hid in the clouds; and when those were clear, Pichincha was involved in clouds. It was therefore necessary to erect their signals in a lower situation, and in a more favourable region. This, however, did not produce any change in their habitation till the beginning of December; when, having finished the observations which particularly concerned Pichincha, they proceeded to others; but with no abatement either of inconveniences, cold, or fatigue; for the places where they made their observations being necessarily on the highest parts of the defarts, the only refuge in which they enjoyed some little ease was during the short interval of falling from one to the other.

In all their stations subsequent to those on Pichincha, during their fatiguing meditation of the degrees of the meridian, each company lodged in a field-tent, which, though small, they found less inconvenient than the hut on Pichincha; though at the same time they had more trouble, being oftener obliged to clear it from the snow, as the weight of it would otherwise have demolished the tent. At first, indeed, they pitched it in the most sheltered places; but on taking a resolution that the tents themselves should serve for signals, to prevent the inconvenience of EW of W, they removed them to a more exposed situation, where the impetuosity of the winds sometimes tore up the piquets, and blew them down.

Though this mountain is famous for its great height, it is considerably lower than the mountain of Cocopaxi: but it is impossible to conceive the coldness of the summit of the last-mentioned mountain from that felt on this; since it must exceed every idea that can be formed by the human mind, tho' they are both seated in the midst of the torrid zone. In all this range of mountains, there is said to be a constant inferior boundary, beyond which the snow never melts: this boundary, in the midst of the torrid zone, is said by some to be 2,434 fathoms above the level of the sea; by others, only 2,400 feet. The snow indeed falls much lower, but then it is subject to be melted the very same day. It is affirmed, that there are in the Andes 16 volcanoes or burning mountains, which throw out fire and smoke with a terrible noise. The height of Chimborazo, said to be the highest peak of the Andes, has been determined by geometrical calculations to be 20,282 feet. But the great differences between the calculations of the height of mountains in other parts of the world, must very much diminish the credit of such calculations. Instances of this we have already given under the article Æra-

Andes, a hamlet of Mantua in Italy, the birthplace of Virgil. Hence the epithet Andinus (Silius Italicus). Now called Piosola, two miles to the west of Mantua.

Andes, a volcane in the province of Loja, in Peru. It is situated in 14° 30' south latitude, and 60° 50' west of the meridian of Greenwhich. It is considered as the highest volcano in the world, and is celebrated for its production of gold and silver. The top of the mountain is composed of stone, and the sides are covered with snow. The height of the mountain is estimated at 24,000 feet, and it is visible from a distance of 20 miles. The volcano is very active, and frequently erupts, throwing up columns of fire and smoke. The inhabitants of the surrounding country are said to be rich in gold and silver, which they obtained by mining in the mountains. There are many springs of hot springs in the vicinity, which are used for the cure of diseases. The climate around the volcano is cold, and the air is charged with the smoke and ashes of the eruption. The volcano is the object of much interest to geologists, as it affords valuable information respecting the formation of mountains and the phenomena of volcanic action.

And Euse, a city of Languedoc in France, situated in 44° 50' north latitude, and 2° 30' west of the meridian of Paris. It is the capital of the department of Gard, and is the seat of a bishopric. The city is situated on a hill, and is surrounded by a wall. The castle of the bishops is a large and magnificent building, and is one of the most ancient in France. The city is celebrated for its manufactures of glass and porcelain, and is also noted for its fine gardens. The surrounding country is fertile, and produces a wealth of corn, fruit, and vegetables. The climate of the city is mild, and the air is invigorating. Andes, a mountain in the Andes, consisting of a series of high peaks, including the highest point of the Andes, known as Chimborazo. The mountain is covered with snow for much of the year, and is a source of great beauty and interest to visitors in the region. It is also known for its volcanic activity, with frequent eruptions that have created a unique and fascinating landscape. The Andes mountain range is one of the most well-known and visited tourist destinations in the world, offering a range of activities such as hiking, climbing, and cultural exploration. In addition, the region is home to a rich and diverse array of wildlife, including various species of birds, mammals, and plants. Andes has a long and complex history, with native populations who have lived in the area for thousands of years, and a more recent history influenced by Spanish and other colonial forces.
as and eloquence necessary to a good preacher; and Rolwicd says, that he brought to the council of Trent the understanding of a most profound divine, and the eloquence of a consummate orator.

ANDRACHNE, BASTARD ORPINE: A genus of the gynandra order, belonging to the monoeica class of plants; and in the natural method ranking under the 38th order, Tricoccce. The characters are: 1. The male callus consists of five leaves; the corolla has five petals; and the flamina, which are also five in number, are inserted into the stylos: The female calyx is divided into five leaves; there is no corolla; the style is three; and the carpelle is trilocular, containing three seeds.

Species. 1. The telephoides, or herbaceous trailing andrachne, is a low plant, whose branches trail upon the ground. The leaves are small, of an oval shape, smooth, and of a sea-green colour. It is found wild in some parts of Italy and the Archipelago; but is a plant of no great beauty, and therefore seldom cultivated.

2. The fruitcola, or thorny bastard orpine, is a native of China and some places of America, or brought by him from seeds sent from Jamaica. It has a stem, 12 or 14 feet high. The leaves are spear-shaped, pointed, and smooth; and under them are produced the footstalks of the flowers, which are small, and of a herbaceous white colour. 3. The arborea, with a tree-like stalk. This species was discovered by the late Dr William Houlton, growing naturally at Campseachy.

It has a strong woody item, which rises more than 20 feet high, and sends out many branches on every side. A fourth fort is also mentioned by Dr Miller as raised by him from seeds sent from Jamaica. It agrees in general with the third fort; but the leaves are somewhat like the laurel, only much larger.

Culture. The first species may be raised, by sowing the seeds in March, on a moderate hot-bed. The plants may be removed into small pots, and plunged into another very moderate hot-bed, to bring them forward; but in mild weather they should have plenty of air admitted to them, and be frequently refreshed with water. In June they will produce flowers, and the seeds will ripen in August and September. The other species are very tender, and therefore must be kept constantly in the bank-floes. It is very difficult to procure good seeds of these sorts; the flowers often containing nothing, though they appear very fair outwardly.

ANDRAPODISMUS, in ancient writers, the telling of perfoms for slaves. Hence also andrapodisfe, a dealer in slaves, more particularly a kidnapper, who steals men or children to sell them; a crime for which the Thesallians were noted.

ANDRAPODACEI, in antiquity, a kind of dealers in slaves. The andrapodaceei had a particular procyes for taking off molees and the like disfigurements on the faces of the slaves they kept for sale, by rubbing them with bran. At Athens, several places in the 39th order were appointed for the sale of slaves. Upon the first day of every month, the merchants called andrapodaceei brought them into the market, and exposed them to sale; the crier standing upon a stone erected for that purpose, called the people together.

ANDREA (St), a small village on the Malabar coast in the East-Indies, founded originally by the Portuguese. It takes its name from a church dedicated to St Andrew, and served by the priests of St Thomas.

ON the shore of St Andrea, about half a league out in the sea, lies Mud-bey, a place which few in the world can parallel. It is open to the wide ocean, and has neither island nor bank to break the force of the billows, which come rolling with great violence from all parts, in the south-west monsoons: but on this bank of mud they lose themselves, and flaps lie on it as freely as in the best harbour, without motion or disturbance. It reaches about a mile along shore, and has been observed to shift its place from the northward about three miles in 30 years. From St Andrea to Kraganor, about 12 leagues to the south, the water has the bad property of causing swellings in the legs of those who drink it constantly. Some it affects in one leg, and some in both. It caueses no pain, but itching; nor does the swelled leg seem heavier to the owner than the small one, though some have been seen a yard in circumference at the ankle. The Romish legends impute the cause of this distemper (for which they have no cure) to the earth having been his to found) to a curse laid by St Thomas upon his murderers and their posterity; though, according to the Romans themselves, St Thomas was killed by the Tillinga priests at Melaphur, on the coast of Coromandel, about 400 miles distant, and where the natives have not this distemper.

ANDREAS (John), a celebrated canonist in the 14th century, was born at Mugello, near Florence; and was professer of canon-law at Padua, Pisa, and afterwards at Bologna. It is said that he macerated his body with fasting; and lay upon the bare ground every night for 20 years together, covered only with the skin of a bear. This is attested by very good authors; but if the story which Poggio tells of him in his Italia be true, he must afterwards have relaxed much of this continency: "Joannes Andreas, (says he), dicit Bononiensem, ejus fame admodum vulgata est, subagitamem ubi infleta fapientiae mulier in virum verfa, Ubis nunc, qui Joannes, est sapientia vestra? Ille nil amplius locutus, in vulva latus, respondit, loca admodum sapientiae accommodata." The French translation of this perhaps will not be displeasing.

Jean, dit Andrés, fameux Docteur des Lois,
Fut pris un jour au pêché d'amourcette:
Il avoit une jeune fosbrette.
Sa femme vint, fit un signe de croix.
"Hé bien, dit elle, est ce vous? mon je poyse?
Vous, dont par tout en cause la prudence.
Qu'est devenu cet esprit si fubtil?
Le bon André, pour suivant fou nœgoe,
Honteux pourtant, ma foi, répondit il,
Prudence, esprit, tout gîst dans cette foîte.

Since it is agreed that John Andreas had a bastard, this story is at the bottom very probable; and it was perhaps with the mother of Basadonius that his wife found him. Andreas had a beautiful daughter, named Novella, whom he loved extremely: and he is said to have introduced her so well in all parts of learning, that when he was engaged in any affair which hindered him from reading lectures to his scholars, he sent his daughter in his room; and left her beauty should prevent the
Andreu, a learned canonist, mentions of his writings, he had been befown upon him. He has been called "Rabbi dolfior" by being present and minifier baptized; and, in attention of the hearers, of salvation. After this, I was sent for by the kingdom, which their majesties had conquered: by catholic princes king Ferdinand and queen Isabella, God's blessing on my preaching, an infinite number of queen Isabella to Aragon, that I might be employed in the conversion of the Moors of those kingdoms, who ineffectual excellent and pious design of her Majesty was rendered Garcia, Confusión impofures, forgeries, brutalities, follies, obfcenities, abfurditics, impoffibilities, lies, and contradictions, which Mahomet, in order to deceive the fimple people, has difperfed in the writings of that fect, and especial-ly in the alcoran, which, as he fays, was revealed to Andreini him in one night by an angel, in the city of Meke; in another place he endeavoureth himself, and affirms that he was 20 years in composing it. Andreini tells us, he wrote this work, that not only the learned among Christians, but even the common people might know the different belief and doctrine of the Moors: and on the one hand might laugh and ridicule fuch infolent and brutal notions, and on the other might lament their blindnefs and dangerous condition. This book, which was published at firft in Spanish, has been translated into feveral languages; all thofe who write against the Mahometans quote it very much.

ANDREINI (Isabella), a native of Padua, was an excellent poetef, and one of the best comedians in Italy, towards the beginning of the 17th century. The Intent of Pavia thought they did their Society an honour by admitting her a member of it; and she, in acknowledgement of this honour, never forgot to mention amongst her titles that of Academica Infanta: her titles were thefe, "Isabella Andreini, comica gelosa, academica infanta, detta l'accesa." She was alfo a woman of extraordinary beauty; which, added to a fine voice, made her charm both the eyes and ears of the audience. She died of a miscarriage, at Lyons, the 10th of June, 1604, in the 42d year of her age. Her death being a matter of general concern and lamentation, there were many Latin and Italian elegies printed to her memory; feveral of thofe pieces were placed before her poems in the edition of Milan, in 1605. Besides her laments, madrigals, fongs, and elegies, there is a pastoral of hers intitled Myrtilla, and letters, printed at Venice in 1619. She fung extremely well, played admirably on feveral instruments, understood the French and Spanifh languages, and was not unacquainted with philofophy.

ANDREINUS (Publius Faunus), born at Forli in Italy, he was a long time professor of poetry and philofophy in the university of Paris. Lewis XII. of France made him his poet laureat; and Erasminus tells us he was likewise poet to the queen. His pen was not wholly employed in making verses for her; he wrote alfo moral and proverbial letters in prose, which were printed several times. His poems, which are chiefly in Latin, are inserted in Vol. I. of the Deliciae poetarum Ita­lorum. Mr De la Monnoie tells us, "that Andreinus, when he was but 22 years old, received the crown of laurel: that his love-verfes, divided into four books, intitled Livia, from the name of his mistrefes, were esteemed fo fine by the Roman Academy, that they adjudged the prize of the Latin elegy to the author. He died in 1518. This author's manner of life was not very exemplary; yet he was fo fortunate, fays Erasminus, that though he took the liberty of rallying the divines, he was never brought into trouble about it."

ANDREW (St.), the apostle, born at Bethsaida in Galilee, brother to Simon Peter. He had been a disciple of John the baptift, and followed Jesus upon the testimony given of him by the baptift, (John i. 30, 37, &c.) He followed our Saviour with another of John's disciples, and went into the house where Jesus lodged: here he continued from about four o'clock in the afternoon till it was night. This was the firft disciple whom our Saviour received into his train. Andrew introduced his brother Simon, and they paffed a day with
with Christ, after which they went to the marriage in Cana (id. ii.), and at last returned to their ordinary occupation. Some months after, Jesus meeting them while they were both fishing together, called them to him, and promised to make them fishers of men. Immediately they left their nets, followed him, (Matt. iv. 19.) and never afterwards separated from him.

After our Saviour's ascension, his apostles having determined by lot what parts of the world they should severally take, Scythia and the neighbouring countries fell to St Andrew, who according to Eusebius, after he had planted the gospel in several places, came to Patrae in Achaia, where, endeavouring to convert the proconsul Ægeas, he was by that governor's orders scourged and then crucified. The particular time of his suffering martyrdom is not known; but all the ancient and modern martyrologies, both of the Greeks and Latins, agree in celebrating his festival upon the 30th of November. His body was embalmed, and decently interred at Patrae by Maximilla, a lady of great quality and estate. Afterward it was removed to Constantinople by Constantin the Great, and buried in the great church, which he had built to the honour of the Forfar, and Kincardine thenceforward. Forfar, and Kincardine (See CROSS.) St Andrew's church of Hippolytus the places it was an olive-tree. valid with what would at once increase the fame that Peter Chrysologus says, colm II. is preserved in Constantinople by Constantin the Great, and buried in the greatest part of the archbishopric.

There is a cross to be seen in the three principal churches of St Andrew's, one in form of the letter X, and is inclosed in a silver shrine. Peter Chrysologus says, that he was crucified upon a tree; and the ipurious Hippolytus affures us it was an olive-tree.

Andrew, or Knights of St Andrew, an order of knights, more usually called the order of the thistle. (See THISTLE.)

Knights of St Andrew, is also an order instituted by Peter the Great of Muscovy in 1698; the badge of which is a golden medal; on one side whereof is represented St Andrew's cross, with these words, Cæsar Pierre monarque de tout la Raffle. This medal, being fastened to a blue ribbon, is suspended from the right shoulder.

St Andrew's Cross, one in form of the letter X. (See CROSS.)

St Andrew's Day, a festival of the Christian church, celebrated on the 30th of November in honour of the apostle St Andrew.

Andrew's (St), a town of Fife-shire, in Scotland, once the metropolis of the pifiith kingdom, lying in W. Long. 1° 25'. N. Lat. 56° 18'. If we may credit legend, St Andrew's owes its origin to a singular accident. St Regulus (or St Rule, as he is likewise called), a Greek of Achaia, was warned by a vision to leave his native country, and visit Albion, an isle placed in the remotest part of the world; and to take with him the arm-bone, three fingers, and three toes of St Andrew. He obeyed, and set sail with his companions, but had a very tempestuous passage. After being tossed for some time on a stormy sea, he was at last shipwrecked on the coasts of Otholania, in the territories of Hercules king of the pifi, in the year 370. On hearing of the arrival of the Strangers, with their precious relics, the king immediately gave orders for their reception, afterwards presenting the saint with his own palace, and building near it the church, which still bears the name of St Regulus.

At this time the place was filled Macraft, or the land of boars: all round was forest, and the lands belonging on the Saint were called Byrehid. The boars equalled in size the ancient Erymanthian; as a proof of which, two tulk, each sixteen inches long and four thick, were chained to the altar of St Andrew's. St Regulus changed the name to Kilrymont; and established here the first Christian priests of the country, called Gilders. This church was supreme in the kingdom of the Pifi; Ungus having granted to God and St Andrew, that it should be the head and mother of all the churches in his dominions. He also directed that the cross of St Andrew should become the badge of the country. In 518, after the conquest of the Pifi, he removed the episcopal see to St Andrew's, and the Bishop was styled maximus Scottorum episcopus. In 1141, it was erected into an archbishopsic by Sextus IV. at the intercession of James III. In 1606, the priory was suppressed; and, in 1617, the power of election was transferred to eight bishops, the principal of St Leonard's college, the archdeacon, the vicars of St Andrew's, Lenchars, and Curwar. This see contained the greatest part of the shire of Fife, with a part of Perth, Forfar, and Kincardine shires, and a great number of parishes, churches, and chapels in other dioceses.

The town of St Andrew's was erected into a royal borough by David I. in the year 1140, and their privileges afterwards confirmed. The charter of Malcolm II. is preferved in the tolbooth; and appears written on a bit of parchment, but the contents equally valid with what would at this time require whole skins. Here also are kept the silver keys of the city; which, for form's sake, are delivered to the king, if he should visit the place, or to a victorious enemy, in token of submission. In this place, likewise, is to be seen the magnificent x which, in 1646, took off the heads of Sir Robert Spotwood and other distinguished loyalists. The town underwent a siege in 1537: at which time it was possessed by the English, and other partizans of Balios; but the loyalists, under the earls of March and Fife, made themselves masters of it in three weeks, by the help of their battering machines.

St Andrew's is now greatly reduced in the number of inhabitants, at present scarcely exceeding 2000. It is impossible to ascertain the sum of the inhabitants: All that can be known is, that during the period of its splendour, there were between 60 and 70 bakers; but now 9 or 10 are sufficient for the place. It is a mile in circuit, and contains three principal streets. On entering the west port, a well- built street, straight, and of vast length and breadth, appears; but so grass-grown, and presenting such a dreary solitude, that it forms the perfect idea of having been laid waste by the pestilence.

The cathedral of St Andrew's was founded by Bishop Arnold in 1161, but did not attain its full magnificence till 1318. Its length from east to west was 370 feet; that of the transept, 222. But tho' this vast pile was 157 years in building, John Knox, in June 1559, effected its demolition in a single day; and so efficiently has it been destroyed, that nothing now remains but part of the east and west ends, and of the south side.

Near the east end is the chapel of St Regulus; the tower of which is a lofty equilateral triangle, of 20 feet each side, and 103 feet high; the body of the chapel remains,
Andrew's remains, but the two side chapels are ruined. The arches of the windows and doors are round, and some even more than semicircles: an undoubted proof of their antiquity.

The priory was founded by Alexander I. in 1122; and the monks (canons regular of St Augustine) were brought from Scone, in 1140, by Robert, bishop of this see.

By an act of parliament, in the time of James I. the prior had precedence of all abbots and priors, and brought with him the monks (canons regular of St Augustine) were formerly except the walls of the Church of Kirk, the ugh, originally founded by Bishop Kennedy, and extended near the high altar of the cathedral, with this singular epitaph:

Hic fuit ecclesia direc. columna, fenestra
Lucida thoribulum redolens, compana fana.

This castle was the residence of cardinal Beaton; who, after the death of George Wiliart, apprehending some danger, caused it to be fortified so strongly as to be at that time deemed impregnable. In this fortress, however, he was surprized and assassinated by Norman Lely with 15 others. They seized on the gate of the castle early in the morning of May 29, 1546; it having been left open for the workmen who were finishing the cloisters, and having placed centinels at the door of the cardinal's apartment, they awakened his numerous domestics one by one; and, turning them out of the castle, they, without violence, tumult, or offering any injury to any other person, inflicted on Beaton the death he justly merited. The conspirators were immediately beseiged in this castle by the regent, earl of Arran; and notwithstanding they had acquired no greater strength than 150 men, they resifted all his efforts for five months. This, however, was owing to the unskillfulness of the besiegers more than to the strength of the place or the valor of the besieged; for in 1547 the castle was reduced and demolished. The entrance of it is still to be seen; and the window is shown, out of which it is said the cardinal leaned to glit his eyes with the cruel martyrdom of George Andrew's friend Wilhart, who was burnt on a spit beneath.

In the church of St Salvator is a most beautiful tomb of bishop Kennedy, who died, an honour to his family, in 1466. The Gothic work is uncommonly elegant. Within the tomb were discovered six magnificent maces, which had been concealed here in troubous times. One was given to each of the other three Scotch universities, and three are preserved here. In the top is represented our Saviour; around are angels, with the instruments of the passion.

With these are shown some silver arrows, with large silver plates affixed to them, on which are inscribed the arms and names of the noble youth, visitors in the annual competitions in the generous art of archery, which were dropped but a few years ago; and golf is now the reigning game. That sport, and foot-ball, were formerly prohibited, as unseemly and unprofitable to the public; and at all weapon shewings, or reviews of the people, it was ordered, that foot-ball and golf be utterly cried down, and that bow-markets be paid at ilk parish kirk, a pair of butts and schuttin be used, and that man schutte fish fottes at leaf, under the pains to be raised upon them that commits not, at least two pence, to be given to them that commits to the bow-markets a drink.

The celebrated university of this city was founded in 1411, by bishop Wardlaw; and the next year he obtained from Benedict III. the bull of confirmation. It consisted of three colleges.

1. St Salvator's, founded in 1538, by bishop Kennedy. This is a handsome building, with a court or quadrangle within: on one side is the church, on another the library; the third contains apartments for students; the fourth is unfinished.

2. St Leonard's college was founded by Prior Hepburn, in 1522. This is now united with the hall, and the buildings fold and converted into private houses.

3. The new, or St Mary's college, was establlished by archbishop Hamilton in 1553: but the house was built by James and David Bethune, or Beaton, who did not live to complete it. This is said to have been the site of a schola Siliarius long before the establishment of the university; where several eminent clergymen taught, gratis, the sciences and languages. But it was called the new college, because of its late erection into a divinity college by the archbishop.

The university is governed by a chancellor, an archdeacon, a registrar, and several other officers. It is conducted by the two principals, and the professors of both the colleges.

The rector is the next in order of succession; to whose care is committed the privileges, discipline, and statutes of the university. The colleges have their rectors, and professors of different sciences, who are indefatigable in their attention to the instruction of the students, and to that essential article, their morals. This place possesses several very great advantages respecting the education of youth. The air is pure and wholesome; the place for exercise dry and extensive; the exercises themselves are healthy and innocent. The university is fixed in a most unfitted country, remote from all commerce with the world, the haunt of dissipation. From the smallness of the society every student's character is perfectly known.
No little irregularity can be committed, but it is instantly discovered and checked: vice cannot attain a head in this place, for the incorrigible are never permitted to remain the corrupters of the rest.

The trade of St Andrew's was of very considerable. So late as the reign of Charles I. this place had 30 or 40 trading vessels, and carried on a considerable herring and white fishery, by means of busses, in deep water; which fisheries had for ages been the grand source of their commerce, wealth, and splendour. After the death of the king, this whole coast, and St Andrew's in particular, became a scene of murder, plunder, and rapine: every town suffered in proportion to its magnitude and opulence. Nor were those hypothetical rumours satisfied with the shipping, merchandise, plate, cattle, and whatever came within their sight; they also laid the whole coast under contribution. St Andrew's was required to pay rent, but the inhabitants not being able to raise that sum after being thus plundered, the general compounded for 500l., which was raised by a loan at interest, and hath remained a burden upon the corporation, it is believed, ever since.

The harbour is artificial, guarded by piers, with a narrow entrance, to give shelter to vessels from the violence of a very heavy sea, from the encroachments of which it hath suffered much. The manufactures this city might in former times possess, are now reduced to one, that of golf-balls; which, trifling as it may seem, maintains a great number of people. It is, however, commonly fatal to the artist; for the balls are made by fusing a great quantity of feathers into a leathern case, by help of an iron rod, with a wooden handle, pressed against the breast, which seldom fails to bring on a consumption.

Andrew's (Lancelot), bishop of Winchester, was born at London in 1555, and educated at Cambridge. After several preferments, he was made bishop, first of Chichester, then of Ely; and, in 1618, was raised to the see of Winchester. This very learned prelate, who was distinguished by his piety, charity and integrity, may be justly ranked with the best preachers and complete scholars of his age; he appeared to much greater advantage in the pulpit than he did in low in his works, which abound with Latin quotations and trivial witlings. His sermons, though full of puns, were rated to the taste of the times in which he lived, and were consequently greatly admired. He was a man of polite manners and lively conversation; and could quote Greek and Latin authors, or even pun with king James. There is a pleasant story related of him in the life of Waller the poet. When that gentleman was young, he had the curiosity to go to court, and sift in the circle to see king James dine; where, among other company, there sat at table two bishops, Neale and Andrews. The king propounded this question, Whether he might not take his subjects money when he needed it, without all this formality of parliament? Neale replied, "God forbid you should, for you are the breath of our nostrils." Whereupon the king turned, and said to the bishop of Winchester, "Well, my lord, what say you?" "Sir, (replied the bishop,) I have no skill to judge of parliamentary cafes." The king answered, "No puts-off, my lord; answer me presently." "Then, Sir (said he), I think it lawful for you to take my brother Neal's money, for he offers it." Mr Waller says, the company was pleased with this answer, but the wit of it seemed to affect the king; for a certain lord coming after, his majesty cried out, "O, my lord, they lay you lie with my lady." "No, Sir (says his Lordship, in coulusion), but I like her company because she has to much wit." "Why then (says the king) do you not lie with my lord of Winchester there?"—This great prelate was in no less reputation and esteem with king Charles I. than he had been with his predecessors. He died at Winchester-house in Southwark, September 27, 1626, in the 71st year of his age; and was buried in the parish-church of St Saviour's, where his executors erected to him a very fair monument of marble and alabaster, on which is an elegant inscription, in Latin, written by one of his chaplains. Mr Milton also, at 17 years of age, wrote a beautiful elegy on his death, in the same language. Bishop Andrews had, 1. A share in the translation of the Pentateuch, and the historical books from Joshua to the first book of Chronicles exclusively. He also wrote, 2. Tortu.s Torti, in answer to a work of Cardinal Bellarmine, in which that cardinal affinnes the name of Matthew Tortus. 3. A Manual of Private Devotions: and, 4. A Manual of Directions for the Abstinence of the Sick; besides the Sermons and Treatises in English and Latin, published after his death.

ANDRIA, in Grecian antiquity, public entertainments first instituted by Minos of Crete, and, after his example, appointed by Lycurgus at Sparta, at which a whole city or tribe assembled. They were managed with the utmost frugality, and persons of all ages were admitted, the younger fort being obliged by the lawgiver to repair thither as to schools of temperance and sobriety.

ANDRIA, is a city and a bishop's see in the territory of Bar, in the kingdom of Naples. It is pretty large, well peopled, and seated in a spacious plain, four miles from the Adriatic coast. E. Long. 17. 4. N. Lat. 41. 15.

ANDRISCUS, a man of mean extraction, who, pretending to be the son of Pheius last king of Macedonia, took upon him the name of Philip, for which reason he was called Pseudo-Philippus, the False Philip. After a complete victory over Juventus, the Roman Praetor sent against him, he assumed kingly power, but exercised it with vast cruelty. At last, the Romans obliged him to fly into Thrace, where he was betrayed and delivered into the hands of Metellus. This victory gained Macedonia once more into the power of the Romans, and to Metellus the name of Macedonius, but cost the Romans 25,000 men. Andricus adorned the triumph of Metellus, walking in chains before the general's chariot.

ANDROAS, or ANDRODAMAS, among ancient naturalists, a kind of pyrite, to which they attributed certain magical virtues.

ANDROGENUS, in fabulous history, the son of Minos king of Crete, was murdered by the Athenian youth and throe of Megara, who envied his being always victor at the Attic games. But Minos having afterwards taken Athens and Megara, obliged the inhabitants to send him an annual tribute of seven young men and as many virgins, to be devoured by the Minotaur; but Theseus delivered them from that tribute.

ANDROGYNE, in natural history, a name gi-
Androgynes, as we have seen, are the living creatures which, by a monstrous formation of their generative parts, seem (for it is only seeming) to unite in themselves the two sexes, that of the male and of the female. This is a departure in the structure of the parts intended by nature, which they found, which they believed, were the best adapted for the discharge of procreative functions, the pudenda of the other sex likewise appear. This monstrous production of nature is diversified in four different ways; of which three appear in males and one in females. In men, the female pudendum clothed with hair, sometimes appears contiguous to the perineum; at other times in the middle of the scrotum; at other times, which constitutes the third variety, through that part itself which in the midst of the scrotum exhibits the form of a pudendum, urine is emitted. Near that part which is the seat of puberty, and above the pudendum, even in females, the masculine genitals appear in some, conspicuous in all their three forms, belonging to the female; on the other hand, like the testicles; but for the most part it happens, that of the two instruments of generation, one is feeble and inert; and it is extremely rare that both are found sufficiently valid and proper for feats of love; nay, even in a great many, both these members are deficient and impotent; so that they can perform the office neither of a man nor of a female.

With respect to them, it appears, from a collation of all the circumstances which have been observed by naturalists worthy of credit, that there is no such thing as a perfect androgynous, or real hermaphrodite; that is to say, a living creature which, by its natural, or rather prenatur al, structure, possesses the genuine powers of both sexes, in such a manner as to be qualified for performing the functions of either with facility; the irregularity of their fabrication almost always consists in something superfluous added to one of the sexes, which gives it the appearance of the other, without befogging the real and characteristic distinction; and every hermaphrodite is almost always a very woman. Since this monstrous exhibition of nature is not such as to abrogate the rights or destroy the character of humanity amongst human beings, this involuntary misfortune implies no right to deprive those upon whom it is inflicted by nature, of the privileges natural to every citizen; and this deficiency is no more an insult than any other corporeal mutilation, it is not easy to see why marriage should be prohibited to one of these unhappy beings, merely on account of its equivocal appearance, which acts in the character of its prevailing sex. If such a creature, by the defect of its construction, should be barren; this does not infer any right of dislodging the marriage which it may have contracted, more than the same fertility proceeding from any cause whether known or unknown, if his or her conduct should not on that account require a divorce. It is only the licentious abuse either of one or the other sex which can be follow ed to the animadversion of the police. See Hermaphrodit.

Such are the sentiments of the authors of the French Encyclopaedia. After all, we cannot forbear to add, that from such heterogenous matches nature seems to recoil with innate and inextinguishable horror. Nor are any of these invincible aversions implanted in our frame without a final cause worthy of its Author. We would gladly ask these free-thinking gentlemen, in cases where the sexes are four naturally confounded, how the police can, by its most severe and rigorous animadversions, either detect or prevent these licentious abuses against nature? Since, therefore, an evil so baseless to human society could no other way be prevented than by the function of Nature against such horrible conjunctions, the instinctive antipathy which they inspire was highly worthy of her wisdom and purity.

Androgynes, in ancient mythology, creatures of whom, according to the fable, each individual possessed the powers and characters of both sexes, having two heads, four arms and two feet. The word itself is compounded of two Greek radical words, andro, in genitive andros, a male; and gon, a female. Many of the rabbinical writers pretend, that Adam was created double, one body being male, the other female, which in their origin not being essentially joined, God afterwards did nothing but separate them.

The gods, says Plato, in his Banquet, had formed the structure of man round, with two bodies and two sexes. This fantastic being, possessing in itself the whole human system, was endowed with a gigantic force, which rendered it infolent, inofficious that it resolved to make war against the gods. Jupiter, exasperated, was going to destroy it; but, sorry at the same time to annihilate the human race, he satisfied himself with debasing this double being, by disjoining the male from the female, and leaving each half to subsist with its own powers alone. He assigned to Apollo the task of repopulating these two half bodies, and of extending their skins so that their whole force might be covered. Apollo obeyed, and fastened it at the stumbus: If this half should fall rebel, it was once more to be subdivided by another section, which would only leave it one of the parts of which it was then constituted; and even this fourth of a man was to be annihilated, if it should persist in its obstinacy and mischief.

The idea of these androgy nes might well be borrowed from a passage in Moes, where that historian of the birth and infancy of nature describes Adam as calling Eve bone of his bone and flesh of his flesh. However this may be, the fable of Plato has been used with great ingenuity by a French poet, who has been rendered almost as conspicuous by his misfortunes as by his verses. With the ancient philosopher, he attributes the propensity which attracts one of the sexes towards the other, to the natural ardor which each half of the androgynes feel for reunion; and their inconftancy, to the difficulty which each of the separated parts encounters in its efforts to recover its proper and original half. If a woman appears to us amiable, we instantly imagine her to be that moiety with whom we should only have continued one whole, had it not been for the infolence of our double-sexed progenitor:

The heart, with fond credulity impres's'd,
Tells us the half is found, then hopes for rest;
But 'tis our curse, that sad experience shows,
We neither find our half nor gain repose.

Androgynous, in zoology, an appellative given to animals which have both the male and female sex.
Androïdes, sex in the same individual.—In botany, the term is applied to such plants as bear both male and female flowers upon the same root.

Androïdes, in mechanics, a human figure, which, by certain springs or other movements, is capable of performing some of the natural motions of a living man. The motions of the human body are more complicated, and consequently more difficult to be imitated, than those of any other creature; whence the construction of an Androïdes, in such a manner as to imitate any of those actions with tolerable exactness, is justly supposed to indicate a greater skill in mechanics than any other piece of workmanship whatever.

A very remarkable figure of this kind appeared in Paris, in the year 1738. It represented a flute-player, and was capable of performing many different pieces of music on the German flute; which, considering the difficulty of blowing that instrument, the different contractions of the lips necessary to produce the distinct tones between the high and low notes, and the complicated motions of the fingers, must appear truly wonderful.

This machine was the invention of M. Vaucanson, member of the Royal Academy of Sciences; and a particular description of it was published in the Memoirs of the Academy for that year. The figure itself was about five feet and a half in height, situated at the end of an artificial rock, and placed upon a square pedestal four feet and a half high and three and an half broad. The air entered the body by three pipes separated from one another. It was conveyed to them by nine pairs of bellows, three of which were placed above and six below. These were made to expand and contract regularly in succession, by means of an axis of steel turned round by some clock-work. On this axis were different protuberances at proper distances, to which were fixed cords thrown over pulleys, and terminating in the upper boards of the bellows, so that, as the axis turned, these boards were alternately raised and let down. A contrivance was also used to prevent the disagreeable hissing fluttering noise usually attending the motion of bellows.

This was by making the cord, by which the bellows were moved, pass in its descent, upon one end of a smaller lever, the other end of which ascending forced open the small leathern valve that admitted the air, and kept it so till, the cord being relaxed by the descent of the upper board, the lever fell, and the air was forced out. Thus the bellows performed their functions, continually without the least hissing or other noise by which it could be judged in what manner the air was conveyed to the machine. The upper boards of three of the pairs of bellows were pressed down by a weight of four pounds, those of three others by a weight of two pounds, and those of the remaining ones by nothing but their own weight.

The three tubes, by which the air entered, terminated in three small reed pipes in the trunk of the figure. There they united, and, ascending towards the throat, formed the cavity of the mouth, which terminated in two small lips adapted in some measure to perform their proper functions. Within this cavity also was a small movable tongue; which, by its play, produced the different notes, admitted the air, and conducted its passage to the flute.

The fingers, lips, and tongue, received their proper directions by means of a steel cylinder turned by clock-work. It was divided into 15 equal parts, which Androïdes, by means of pegs, pressing upon the ends of 15 different levers, caused the other extremities to ascend. Seven of these levers directed the fingers, having wires and chains fixed to their ascending extremities, which being attached to the fingers, caused them to ascend in proportion as the other extremity was pressed down by the motion of the cylinder; and vice versa. Thus the ascent or descent of one end of a lever produced a similar ascent or descent in the corresponding finger, by which one of the holes of the flute was occasionally opened or stopped, as by a living performer. Three of the levers served to regulate the ingress of the air, being contrived so as to open and shut, by means of valves, the three reed pipes of air above mentioned, so that more or less strength might be given, and a higher or lower note produced as occasion required. The lips were by a similar mechanism, directed by four levers, one of which opened them, to give the air a freer passage; the other contracted them; the third drew them backward; and the fourth pulled them forward. The lips were projected upon that part of the flute which receives the air; and, by the different motions already mentioned, modified the tone in a proper manner.

The remaining lever was employed in the direction of the tongue, which it easily moved, so as to shut or open the mouth of the flute.

Thus we see how all the motions necessary for a German-flute-player could be performed by this machine; but a considerable difficulty still remains, namely, how to regulate these motions properly, and make each of them follow in just succession. This, however, was effected by the following simple method. The extremity of the axis of the cylinder was terminated on the right side by an endless screw, consisting of twelve threads, each placed at the distance of a line and a half from the other. Above this screw was fixed a piece of copper, and in it a steel pivot, which, falling in between the threads of the screw, obliged the cylinder to follow the threads, and, instead of turning directly round, it was continually pulled to one side. Hence, if a lever was moved, by a peg placed on the cylinder in any one revolution, it could not be moved by the same peg in the succeeding revolution, because the peg would be moved a line and a half beyond it by the lateral motion of the cylinder. Thus, by an artificial disposition of these pegs in different parts of the cylinder, the flautist, as made, by the successive elevation of the proper levers, to exhibit all the different motions of a flute-player, to the admiration of every one who saw it.

The construction of machines capable of imitating even the mechanical actions of the human body, show exquisite skill; but what shall we say of one capable, not only of imitating actions of this kind, but of acting as external circumstances require, as though it were endowed with life and reason? This, nevertheless, has been done. M. de Kempelen, a gentleman of Pressburg in Hungary, excited by the performances of M. de Vaucanson, at first endeavoured to imitate them, and at last far excelled them. This gentleman constructed an Androïdes capable of playing at chess! Every one who is in the least acquainted with this game must know, that it is so far from being mechanically performed, as to require a greater exertion of the judgment...
ment and rational faculties than is sufficient to accomplish many matters of greater importance. An attempt therefore, to make a wooden chef-player, must appear as ridiculous as to make a wooden preacher or counsellor of state. That this machine really was made, however, the public have had ocular demonstration. The inventor went to Britain in 1783, where he remained above a year with his automaton.

It is a figure as large as life, in a Turkish dress, sitting behind a table with doors, of three feet and a half in length, two in depth, and two and a half in height. The chair on which it sits is fixed to the table, which runs on four wheels. The automaton leans its right arm on the table, and in its left hand holds a pipe: with this hand it plays after the pipe is removed. A chef-board of 18 inches is fixed before it. This table, or rather cupboard, contains wheels, levers, cylinders, and other pieces of mechanism; all which are publicly displayed. The vibrations of the automaton are then lifted over its head, and the body is seen full of similar wheels and levers. There is a little door in its thigh, which is likewise opened; and with this, and the table also open, and the automaton uncovered, the whole is wheeled about the room. The doors are then shut, and the automaton is ready to play; and it always takes the first move.

As every move of the wheels are heard; the image moves its head, and looks over every part of the chef-board. When it checks the queen, it shakes its head twice, and thrice in giving check to the king. Its likewife shakes its head when a false move is made, replaces the piece, and makes its own move; by which means the adversary loses one.

M. de Kempelen remarks, as the most surprising circumstance attending his automaton, that it had been exhibited at Presburg, Vienna, Paris, and London, to thousands, many of whom were mathematicians and chef-players, and yet the secret by which he governed the motion of its arm was never discovered. He prided himself solely on the construction of the mechanical powers, by which the arm could perform ten or twelve moves. It then required to be wounded up like a watch, after which it was capable of continuing the same number of motions.

The automaton could not play unless M. de Kempelen or his substitute was near it to direct its moves. A small square box, during the game, was frequently consulted by the exhibitor; and herein consulted the secret, which he said he could in a moment communicate. He who could beat M. de Kempelen was, of course, certain of conquering the automaton. It was made in 1769. His own account of it was; "C'est une bagatelle qu'ont neuf fans merite du coeur du mechanism, mais les effets n'en paroissent ni merveilleux que par la hardieffce de Pidee, & par l'honneur choyez moyens employes pour faire illusion."

The strongest and best-armed loadstone was allowed to be placed on the machine by any of the spectators.

As the inventor of this admirable piece of mechanism hath not yet thought proper to communicate to the public the means by which it is actuated, it is in vain for any, except those who are exquisitely skilled in mechanics, to form conjectures concerning them.—Many other curious imitations of the human body, as well as that of other animals, have been exhibited, though none of them equal to the last mentioned one. See the 2d Androlepsy.

Androlepsy, in Grecian antiquity, an action allowed by the Athenians against such as protected perfons guilty of murder. The relations of the deceased were empowered to seize three men in the city or house whether the malefactor had fled, till he were either surrendered, or satisfaction made some way or other for the murder.

Andromache, the wife of the valiant Hector, the mother of Astyanax, and daughter of Eton king of Thebes in Cilicia. After the death of Hector and the defection of Troy, she married Pyrrhus; and afterwards Helenus the son of Priam, with whom she reigned over part of Epirus.

Andromeda, in astronomy, a northern constellation, behind Pegesus, Cassiopeia, and Perseus. It represents the figure of a woman chained; and is said to have been formed in memory of Andromeda, daughter of Cepheus and Cassiopeia, and wife of Perseus, by whom she had been delivered from a sea-monster, to which she had been exposed to be devoured for her mother's pride. Minerva translated her into the heavens.

The stars in the constellation Andromeda in Ptolomy's catalogue are 23, in Tycho's 22, in Bayer's 27, in Mr Flamstead's no less than 84.

Andromeda, the name of a celebrated tragedy of Euripides, admired by the ancients above all the other compositions of that poet, but now lost.

It was the representation of this play, in a hot summer day, that occasioned that epidemic fever, or phrenzy, for which the Abbeites are often mentioned, wherein they walked about the streets, rehearsing verses, and acting parts of this piece. See Andere.

Andromeda, or Mars' Gysus: A genus of the monogany order, belonging to the decandria class of plants; and in the natural method ranking under the 18th order, Bicornes. The characters are: The calyx is a quinquepartite perianthium, small, coloured, and peltate; the stamens are very numerous, roundish, and fragile; the style is longer than the stamens, and persistent; the carpels are five, united, and united to the ovary, which is divided into five cells: The pericarpium is a roundish five-collared capsule, with five cells and five valves: The seeds are very numerous, roundish, and glossy.

Species. 1. The polifolia is a low plant, growing naturally in bogs in the northern countries. It is difficultly preserved in gardens; and, being a plant of no great beauty, is seldom cultivated. 2. The mariana, a native of North America. It is a low shrub, sending out many woody flarks from the root, which are garnished with oval leaves placed alternately; the flowers are collected in small bunches, are of an herbaceous colour, and shaped like those of the strawberry-tree. They appear in June and July. 3. The paniculata is a native of Virginia and Carolina, growing in moist places. XXXI. The plants usually arrive at the height of ten feet, with thin leaves set alternately, and having their edges finely serrated. The flowers areubulous, small, and of a greenish white, closely set horizontally on one side of the slender flarks. These flowers are faced by berries, which open when ripe; and divide into five sections,
ANDROMEDA, including many small seeds. 4. The arborea are native to the same countries, where it is called the

Androna. 5. The cultivata, a native of Siberia, and like those of North-America. It grows on mucky land, and is therefore very difficult to keep in gardens. The leaves are shaped like those of the box-tree, and are of the same consistence, having several small punctures on them. The flowers grow in short spikes from the extremity of the branches. They are produced single between two leaves, are of a white colour, and a cylindrical or picker-like shape. There are ten other species.

Propagation and Culture. All these sorts, except four, are hardy plants. The fourth species requires to be sheltered from frost in winter, but in the summer should be frequently watered.

The above plants succeed best upon boggy and moist grounds. You must procure the seeds from the places where they grow naturally; a year before which hang many small white flowers like those of the strawberry-tree. 5. The cultivata, a native of Siberia, and like those of North-America. It grows on mucky land, and is therefore very difficult to keep in gardens. The leaves are shaped like those of the box-tree, and are of the same consistence, having several small punctures on them. The flowers grow in short spikes from the extremity of the branches. They are produced single between two leaves, are of a white colour, and a cylindrical or picker-like shape. There are ten other species.

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ANDROS, between Tenedos and Euboea: being one mile distant from the former, and ten from the latter. The ancients gave it various names, viz. Carus, Lybia, Naxia, Epirus, Andros, and Hydryus. The name of Andros received from one Andrusus, appointed, according to Diodorus Siculus, by Rhadamantus, one of the generals, to govern the Cyclades, after they had of their own accord submitted to him. As to the name of Androsus, the same author tells us, that Acharius the son of Eucus, being taken prisoner by the Pelasgians, gave them this island for his ransom, which on that account was called Androsus, or "delivered for one man." The name of Hydra did not obtain in common with other places well supplied with water. It had formerly a city of great note, bearing the same name, and situated very advantageously on the brow of an hill which commanded the whole coast. In this city, according to Strabo and Pliny, stood a famous temple dedicated to Bacchus. Near this temple Mutianus, as quoted by Pliny, tells us, there was a spring called the gift of Jupiter; the water of which had the taste of wine in the month of January, during the feast of Bacchus, which lasted seven days. The same author makes no mention of this spring; but says, that, during the feast of Bacchus, wine flowed, or was at least by the Andrians believed to flow, from the temple of that god. The priests, no doubt, found their account in keeping up this belief, by conveying, through secret conduits, a great quantity of wine into the temple.

The Andrians were the first of all the islanders who joined the Persians at the time Xerxes invaded Greece; and therefore Themistocles, after the victory at Salamis, resolved to attack the city of Andros, and oblige the inhabitants to pay large contributions for the maintenance of his fleet. Having landed his men on the island, he sent heralds to the magnates, acquainting them, that the Athenians were coming against them with two powerful divinities, PERSONATION and force; and therefore they must part with their men, property, or both, as they pleased. The Andrians replied, that they likewise had two mighty deities who were very fond of their island, viz. Poverty and impossibility; and therefore could give no money. Themistocles, not satisfied with this answer, laid siege to the town; which he probably made himself master of and destroyed, as we are informed by Plutarch, that Pericles, a few years after, sent thither a colony of 250 Athenians. It was, however, soon retaken by the Persians; and, on the overthrow of that empire by Alexander the Great, submitted to him, along with the other islands. On his death it sided with Antigonus, who was driven out by Ptolemy. The succedors of the last mentioned prince held it, till it came to the Romans; when Attalos, king of Pergamus, besieged the metropolis at the head of a Roman army; and, having taken it, was by them put in possession of the whole island. Upon the death of Attalos, the republic claimed this island, as well as his other dominions, in virtue of his last will.

Andros is now subject to the Turks; and contains a town of the same name, with a great many villages. It is the most fruitful island in all the Archipelago, and yields a great quantity of silk. There are said to be about 6000 inhabitants, besides those of the villages Arni and Amolchos, who are about two hundred, with a different language and customs, and are called Albaneeus. There are 7 monasteries, a great number of churches, and a cathedral for the bishops of the Roman Catholic persuasion; but most of the inhabitants are of the Greek communion. The Jews had a house and a church in this island; but they were forced to quit them long ago. Here are some delightful valleys; but the air is bad, and the water of the city worse. The women would be agreeable enough, if it was not for their dresses, which is very unbecoming; for they stuff their clothes without the least regard to their shape; but the Albanian women make a much better appearance. The peasants make wicker-baskets, wherewith they supply the greatest part of the Archipelago. They have all sorts of game in the woods and mountains, but know not how to take them for want of guns. Their principal food is goats flesh; for there is no fish to be met with on their coasts. When they are sick, they are obliged to let the disease take its natural course, having neither physician nor surgeon on the island. A cadis, assisted by a few of the principal persons of the island, has the management of civil affairs, and his residence is in the castle: an aga, who presides over the military force, lives in the tower without the city. About two miles from the present town are still to be seen the ruins of a strong wall with the fragments of many columns, chapels, baths, broken statues, and several inscriptions, some of which mention the name and people of Andros, and the priests of Bacchus; from which it is probable that this was the site of the ancient city. E. Long 25° 30'. N. Lat. 37° 30'.

ANDROS (anc. geog.), an island in the Irish sea, (Pliny), called Hedros by Ptolemy: Now Bardsey, distant about a mile from the coast of North-Wales.

ANDROSACE: a genus of the monogynia order, belonging to the pentandra class of plants; and in the natural method ranking under the 21st order, Precisae. The essential characters are, The male calyx is five-leafed; the corolla is five-petaled; the stamens are five, inserted in the rudiment of the style; The female calyx is five-leafed; the corolla is wanting; the style is three; the capsule is trilocular; the seeds are two of this genus Dr Linnaeus reckons six.

Species. 1. The maxima grows naturally in Austria and Bohemia, among the corn. It hath broad leaves, which spread near the ground; from the centre of these the footstalks arise, which are terminated by an unbel of white flowers like those of the curculia. These appear in April and May, and the seeds ripen in June; soon after which the plants perish. 2. The pententriaxis, villata, corna, and lactes, grow naturally on the Alps and Helvetian mountains, as also in Siberia. They are much smaller than the former, seldom growing more than three inches high. Of other species called the Cangara, we have no particular description.

Culture. These plants are propagated by seeds, which should be sown soon after they are ripe, otherwise they seldom come up the same year. If permitted to scatter, they will grow better than when they are sown.

ANDRUM, a kind of hydrocele, to which the people of Malabar are very subject. Its origin is derived from the vitious quality of the country waters, impregnated
ANEAU (Bartholomew), a native of Bourges in France, a man of eminent learning in the 16th century, educated under Melchior Volmar. He was professor at Lyons, where he propagated the doctrines of the Reformation secretly for a long time: but on the festival of the Holy Sacrament 1565, as the procession was passing on towards the college, there was a large stone thrown from one of the windows, upon the Hoët and priest who carried it. The people, enraged at this, broke into the college, and affiliated Mr Aneau, whom they imagined to have been the occasion, and the college itself was shut up next day by order of the city.

ANECDOTE, ANECDOTA, a term used by some authors, for the title of Secret Histories; but it more properly denotes a relation of detached and interesting particulars. The word is Greek μνημονευρια, q. d. things not yet known, or hitherto kept secret. Procopius gives this title to a book which he published against Justinian and his wife Theodora; and he seems to be the only person among the ancients who has represented princes such as they are in their domestic relation.—Varillas has published Anecdotes of the House of Medicis.

ANECDOTES is also an appellation given to such works of the ancients as have not yet been published. In which sense, M. Muratori gives the name Anecdota Graecarum to several writings of the Greek fathers, found in the libraries, and first published by him.—F. Martene has given a Thesaurus Anecdotarum Novus, in folio, 5 vols.

ANEE, in commerce, a measure for grain, used in some provinces of France. At Lyons, it signifies a certain quantity of wine, which is the load an ass can carry at once: which is fixed at 80 English quarts, wine-measure.

ANEMOMETER, in mechanics, implies a machine for measuring the force and velocity of the wind.

Various machines of this kind have been invented at different times, and by different persons. The following has been often experienced, and found to answer the intention.

An open frame of wood, ABCDEFGHI, is supported by the shaft or arbor J. In the two cross-pieces XXXI. H, K, L, M is moved a horizontal axis QM, by means of the four falls ab, cm, off, gb, exposed to the wind in a proper manner. Upon this axis is fixed a cone of wood, MNO; upon which, as the falls move round, a weight R, or S, is raised by a string round its super- fices, proceeding from the smaller to the larger end NO. Upon this larger end or base of the cone, is fixed a rocket wheel, whose teeth the click X falls, to prevent any retrograde motion from the depending weight.

The structure of this machine sufficiently shows that it may be accommodated to estimate the variable force of the wind; because the force of the weight will continually increase as the string advances on the conical surface, by acting at a greater distance from the axis of motion; consequently, if such a weight be added on the smaller part M, as will just keep the machine in equilibrio in the weakest wind, the weight to be raised as the wind becomes stronger, will be increased in proportion, and the diameter of the cone NO may...


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will thrive and increafe greatly, if they are not

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ble; their colours are white, blue, or violet. They

appearance. 2. The appennina is likewife a native of

flowers, are only the following,

Thefe two are natives of the Levant, particularly of

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fingers make a hole in the centre of each

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The feeds

their roots. The earth

should be laid in the beds at leat a

three weeks before the roots are planted, and a longer

time would be yet better, that it may fette; and when

they are planted, flir the upper part of the foil about

flices inches deep, with a fpade; then take it ever and

smooth, and with a flick draw lines each way of the bed at

flices inches distance, fo that the whole may be in

The roots may be planted regularly: then with

fingers make a hole in the centre of each square,

about three inches deep, laying therein a root with the

eye uppermoft; and when the bed is finished, with the

head of the rake draw the earth smooth, fo as to cover

the crown of the roots about two inches thick.

The beft season for planting thefe roots, if for

fowers, is about the latter end of September,

and for thofe of a middling feafon any time in Oc­

but obferve to perform this work, if po­

at or near

the

time of fome gentle flowers; for if planted when

the ground is perfectly dry, and there fhould no rain

fall for three weeks or a month after, the roots will be

very apt to grow mouldy upon the crown; and if once

they get this diftemper, they seldom come to good after

As all the fine varieties of thefe flowers were firft

obtained from feeds, fo no good florift that hath gar­

room fhould neglect to fow them; in order to which,

he fhould provide himfelf with a quantity of good

roots of the fingle (or what the gardeners call poppy)

ame­

of the beft colours and fuch as have strong

items and large flowers, but efpecially fuch as have

rue leaves than common, and alfo other good properties:

thefe fhould be planted early, that they may have

strength to produce good feeds, which will be ripe in

three weeks or a month's time after the flowers are

pan; when the feeds muft be carefully gathered, oth­

erwise they will be blown away in a short time, as being

in­

downy fubfance. You muft preferve this

feed till the beginning of August, when you may ei­

and not the dung and turf, and to let it have the ad­

vantages of the free air. In doing this work, be care­

ful to rake out all the great stones, and break the

clods; but by no means lift or screen the earth, which has

been found very hurtful to many forts of roots. This earth

should be mixed twelve months before it is used, if po­

ible; but if contrained to use it looser, it muft be the

of tener turned over to mellow and break the

oberving to rake out all the parts of the green flar­

that are not quite rotten, before it is used, as they

would be prejudicial to the roots if suffered to remain.

The beginning of September is a proper feafon to

prepare the beds for planting, which (if in a wet foil) should

be raifed with this fort of earth fix or eight inches above

the surface of the ground, laying at the bottom fome

of the rakings of the heap to drain off the moifure;

but, in a dry foil, three inches above the surface will be

fufficient; this compoft should be laid at leat two feet

and a half thick, and in the bottom there fhould be

about four or five inches of rotten neats dung, or the

rotten dung of an old melon or cucumber bed. The

beds muft be laid (if in a wet foil) a little round, to

flood off the water; but in a dry one, nearer to a

level. In wet land, where the beds are raised above the

surface, it will be proper to fill up the paths between

them, in winter, either with rotten tan or dung, to pre­

vent the froft from penetrating into the fides of the beds,

which otherwife may defroy their roots. The earth

should be laid in the beds at leat a fortnight or three 

weeks before the roots are planted, and a longer

time would be yet better, that it may fette; and when

the feeds

in

the

other good properties:

be carefully gathered, otherwise it

be gathered, other­wise it

be carefully gathered, other­wise it
the wood-anemone; and, according to Linnaeus and Gunner, many observations have proved that it causes the bloody flux among them.

Sea-Anemone. See Animal-Flower.

ANEMOSCOPE. See Wind-Gauge.

The machine which shows the course of the wind, or from what point of the compass it blows, consists of an index moving about an upright circular plate, like the dial of a clock, on which the 32 points of the compass are drawn instead of the hours. The index, which points to the divisions on the dial, is turned by a horizontal axis, having a trundle-head at its external extremity. This trundle-head is moved by a cog-wheel on a perpendicular axis; on the top of which a vane is fixed, that moves with the course of the wind, and puts the whole machine in motion. The whole contrivance is extremely simple; and nothing required in the construction, but that the number of cogs in the wheel, and rounds in the trundle-head, be equal; because it is necessary, that when the vane moves entirely round, the index of the dial also make a complete revolution.

The anemoscope, calculated for indicating the force or velocity of the wind, is the same with what most writers call an anemometer; and we have accordingly described one of those machines under that article. We shall here add another, contrived by the late Mr. Pickering, and published in the Philosophical Transactions, No. 473.

This anemoscope is a machine four feet and a quarter high, consisting of a broad and weighty pedestal, a pillar fastened into it, and an iron axis of about half an inch diameter fastened into the pillar. Upon this axis turns a wooden tube; at the top of which is placed a vane, of the same materials, 21 inches long, consisting of a quadrant, graduated, and jointed with an iron ring, notched to each degree; and a counterpoise of wood, as in the figure, on the other. Through the centre of the quadrant runs an iron pin, upon which are fastened two small round pieces of wood, which serve as moveable radii to desribe the degrees upon the quadrant, and as handles to a velum or sail, whose plane is one foot square, made of canvas, stretched upon four battens, and painted. On the upper batten, next to the hod rim of the quadrant, is a small spring which catches at every notch corresponding to each degree, as the wind shall, by pressing against the sail, raise it up; and prevents the falling back of the sail, upon the lessening of the force of the wind. At the bottom of the wooden tube, is an iron index, which moves round a circular piece of wood fastened to the top of the pillar on the pedestal, on which are described the 32 points of the compass. The figure of this machine is given on Plate XXXI. fig. 4, where a is the pedestal; b, the pillar on which the iron axis is fitted; c, the circle of wood, on which are described the 32 points of the compass; d, the wooden tube upon its axis; e, the velum; f, the graduated quadrant; h, the counterpoise of the vane. The adjoining figure represents the velum, which takes off: a is the plane of the velum; b, the spring; c, the wooden radius, d, e, the holes through which the pin in the centre of the quadrant goes. Its uses are the following.

1. Ha-
Fig. 1. ANCHOR

Fig. 2. ANGUIS VENTRALIS

Fig. 3. ANEMOMETER

Plate XXI

Fig. 4. ANEMOSCOPE

ANDROMEDA PANIULATA
ANE

Having a circular motion round the iron axis, and its divided length, is a faithful indication of 
the wind and its direction. The ingenious contriver of this machine tells us, 
that he carefully examined what dependence may be had upon it, during the forms of February 1743-4, 
and found that it answered extremely well; for that, 
In such winds as the sailors call violent storms, the ma-
chine had six degrees to spare for a more violent gulf, 
before it comes to a horizontal position. It is certainly 
to be depended upon in ordinary weather, the vane 
being hung so tenderly as to feel the most gentle 
breeze. There is, however, reason to fear, that the 
exposing the anemoscope to all winds for a continuance, 
must disorder it, especially irregular blasts and squalls.
It may not therefore be amis, in violent weather, for 
the observer to take the tube with its vane and venum 
in his hand, in order to know the force of the wind 
and, when he has finished his observations, to carry 
the machine into the house, till the violence of the 
storm is abated, when it may be replaced in its former 
position.

ANETHUM, DILL and FENNEL: A genus of the 
digynia order, belonging to the peperarum class of 
plants; and, in the natural method, ranking under 
the 45th order, Umbellatae. The essential characters 
are: The fruit is oval, compressed, atriate; and the 
petals (five) are involute, entire, and very short.
Species. 1. The graveolens, or dill, is an annual 
plant: the root is long, slender, and white; the leaves 
are divided into a multitude of fine, long, narrow seg-
ments, like those of fennel, but of a bluish green co-
lour, and leaves free. The stalk is round and firm, 
growing to the height of four feet, with yellow 
flowers in moderately large umbels. 2. The fc-
iculum, or fennel; of which there are two varieties, 
the common and the sweet. The sweet fennel is smaller 
in all its parts than the common, except the seeds, 
which are considerably larger. The seeds of the two 
forts differ likewise in shape and colour; those of the 
common are roundish, obovate, flatish on one side, and 
protrubant on the other, of a dark almost blackish co-
lour; those of the sweet are longer, narrower, not so 
flat, generally crooked, and of a whitish or pale yel-
lowish colour. Both forts are cultivated in gardens: 
the common is a perennial plant; the sweet fennel pe-
rishes after it has given seed.

Medicinal Uses. 1. Of the first species, dill, only 
the seeds are used. They are of a pale yellowish co-
lour, in shape nearly oval, convex on one side, and 
flat on the other. Their taste is moderately warm and 
pungent; their smell aromatic, but not of the most a-
greeable kind. Several preparations of them are kept 
in the shops. They are recommended as a carminative, 
in flatulent colics, proceeding from a cold cause or a 
vividicity of the juices.—2. Of fennel both the seeds 
and roots are used in medicine. The seeds of both the 
fennels have an aromatic smell, and a moderately 
warm pungent taste: the taste of the sweet fennel is in 
flavour most agreeable, and also have a considerable 
degree of sweetness; hence the use of these only have 
been directed. They are ranked among the four 
greater hot feeds, and not unfavourably looked up 
as good phoanatics and carminatives. A simple water 
is prepared from them in the shops; they are ingredi-
teals also in the compound spirit of juniper, and some 
other officinal compositions. The root is far less warm, 
but has more of a sweetish taste, than the seeds; it is 
one of the five roots called openers; and has some-
times been directed in aperient apomes. Boerhava 
says, that this root agrees in taste, smell, and medical 
qualities, with the celebrated ginseng of the Chinese; 
from which, however, it appears to be very consider-
dibly different. The leaves of fennel are weaker than 
either the roots or seeds, and have very rarely been 
employed for any medicinal use.

ANEURISIM, in surgery, a throbbing tumor, di-
tended with blood, and formed by a dilatation or ru-
ture of an artery. See Surgery-Index.

ANGARI, or Angaril, in antiquity, denote pub-
lic couriers appointed for the carrying of messages. 
The ancient Persians, Budaens observes, had their 
angari, or angari, which was a set of couriers on horse-
back, poised at certain places or distances, always 
readiness to receive the dispatches from one, and 
forward them to another, with wonderful celerity, an-
swering to what the moderns call postes. q. d. postis, as 
being posted at certain places or stages.—The angari 
were also called by the Persians, sana, by the Greeks 
agnathos, upon account of the long journeys they made 
in one day, which, according to Suidas, amounted not 
to less than 1500 Stadia.

ANGARIA, in Roman antiquity, a kind of pub-
lic service imposed on the provincials, which consisted 
in providing horses and carriages for the conveyance of 
military forces, and other public burdens. It is some-
times also used for a guard of soldiers, posted for the 
defence of a place. In a more general sense, it is used for 
young kind of oppression or services performed through 
compulsion.

ANGAZYA, one of the Comoro islands, lying 
between the north end of Madagascar and the coast 
of Zanguebar in Africa, from Lat. 10° to 15° S. It 
is inhabited by Moors, who trade with divers parts of 
the continent, in cattle, fruits, and other commodities 
of the island; which they exchange for callicoes and 
other cotton cloths. The houses here are built of stone, 
and lime made of calcined oyster-shells; with which 
the walls and roof are plastered in a very elegant man-
ner. The government of Angaza is a pure arithocra-
cy; the island being subject to lords, who have all 
the title of Sultan. The people are very careful of 
their women; never permitting strangers to see them, 
without permission from a sultan, or an order which
the stranger brings with him. Many of them read and write Arabic with great facility; and some even understand Portuguese, which they learn from their intercourse with Mosambiques, whither they trade in vessels of 40 tons berthen.

ANGEIOTOMY, in surgery, implies the opening of a vein or artery, as in bleeding: and consequently includes both arteriotomy and phlebotomy.

ANGEL, a spiritual intelligent substance, the first in rank and dignity among created beings. The word angel is Greek, and signifies a messenger: the Hebrew מלאך signifies the same thing. The angels are in Daniel (chap. iv. ver. 13, &c.) called שָׁמִיר, or Watchers, from their vigilance: for the same reason they are, in the remains we have of the prophecy attributed to Enoch, named キュルジオリ; which word imports the same in Greek.

Angels, therefore, in the proper significations of the word, do not import the nature of any being, but only the office to which they are appointed, especially by way of message, or intercourse between God and his creatures; in which sense they are called the ministers of God, who do his pleasure, and ministering spirits sent forth to minister for them that shall be heirs of salvation. That there are such beings as we call angels, that is, certain permanent substances, invisible, and imperceptible to our senses, endowed with understanding and power superior to that of human nature, created by God, and subject to him as the supreme Being; ministering to his divine providence in the government of the world by his appointment, and more especially attending the affairs of mankind; is a truth so fully attested by Scripture, that it cannot be doubted. Nay, the existence of such invisible beings was generally acknowledged by the ancient heathens, though under different apppellations: the Greeks called them δαίμονια; and the Romans genii, or lares. Epicurus seems to have been the only one among the old philosophers who absolutely rejected them. Indeed, the belief of middle intelligences influencing the affairs of the world, and serving as ministers or interpreters between God and man, is as extensive as the belief of a God; having never, so far as we know, been called in question by those who had any religion at all.

The creation of angels is not indeed expressly mentioned by Moses in the first of Genesis, yet it is generally considered by judicious expounders as implied. The reason why the sacred historian is silent on this subject, is supposed by Berrington to be the natural proneness of the Gentile world, and even of the Jews, to idolatry. And it is thought, if they worshipped mere material elements, which was the case, much more might they be inclined to worship such superior and sublime beings as angels. But a better reason is perhaps given by other writers, viz. that this first history was purposely and principally for information concerning the visible world; the invisible, of which we know but in part, being referred for a better life.

On what day they were created has been matter of conjecture. It is a point on which learned men have differed. The Socinians, indeed, hold, says Bishop Hooker, that they were long ago accounted by Moses, but it must have been within the six days' creation; because, as we are informed, that within this space God made heaven and earth, and all things that are therein. All the writers that we have seen on this subject, think they were included in the first day's work, when the heavens were framed.

It has been thought by some persons, that the words of Job, "When the morning stars sang together, and all the sons of God shouted for joy," militate against the creation of angels within the six days. About the meaning of these words, however, expositors are not agreed; but admitting that they refer literally to angels, Dr Lightfoot, Cary, and others, see no difficulty in the passage. The Doctor thinks they were created on the first day, with the heavens; and that they were spectators of God's works in the other parts of creation, and praised and magnified the Lord for his works all along; singing and shouting when God laid the foundation of the earth, as the Jews did at the laying the foundation of the temple, Ezra iii.

On a subject of this nature it would be imprudent to indulge a spirit of conjecture: Scripture is the only standard by which truth and error can be tried, and to this we must ultimately appeal. It is acknowledged that Moses has not expressly mentioned angels by name; yet as we have remarked, their creation is undoubtedly implied; for the heavens must include all that are in them; and therefore it is that the divine penman says, in the conclusion of his creative, "Thus the heavens and the earth were created, and all the host of them." Of the hosts of heaven, the angels must form a considerable part; they are expressly called the heavenly hosts and the armies of heaven, Dan.iv. 30. Lukeii. 13. And if divine authority be admitted as decisive, the reasons adduced by Jehovah for the sanctification of a sabbath, demonstrate that they did not exist previous to the creation of the heavens. It is, surely, inferred with propriety, that in six days the Lord made heaven and earth, the sea, and all that in them is. Similar to which is a declaration of the divine historian relating to the same fact.—"And God blessed the seventh day and sanctified it; because that in it he had rested from all his work which God created and made," Gen. ii. 3. Now if angels existed prior to the six days of creation, the language of Moses is far from being accurate and intelligible; and especially when it is considered that the obscurity might have been removed by adding, "from all the work which God had then created and made." But if angels were created before the heavens, where could they exist? For, as the learned Gill has remarked, "though angels have no bodies, and so are not in the place circumscriptively; yet as they are creatures, they must have an ubi, a somewhere, in which they are definitively; so that they are here, and not there, and much less every where: Now where was there an ubi, a somewhere, for them to exist in, before the heavens and the earth were made? It is most reasonable, therefore to conclude, that as God prepared an habitation for all the living creatures before he made them: as the sea for the fishes, the expanze, or air, for the fowls, and the earth for men and beasts; so he made the heavens first, and then the angels to dwell in them."

That this was the fact, will appear very evident, if the words of Moses be impartially considered. "In the beginning (says he), God created the heavens and the earth," which words must refer to either the beginning of creation or of time; it to the former, and angels previously existing, the language is neither intelligible.
ANG [ 803 ]

Angels

The difficulty remains; for what is time but the measure of creation, or the beginning of the creation and the beginning of time, there could be nothing but eternity; nothing but what was uncreated, that is, nothing but what was without beginning. But if angels were in a pre-existent state, the historian's language is unaccountably strange and inaccurate: for if the phrase in the beginning, which is remarkably emphatical, refer to the creation of the heavens and the earth only, they are unhappily expresed: to expresed, indeed, as to convey no meaning to those who consider words as the vehicle of thought, and as intended to express clearly to others the meaning of the writer. For the natural obvious sense is as follows: in the beginning of the creation of the heavens and the earth, God created the heavens and the earth, language is not only a departure from that perspicuity andprecision which distinguishes all his narrations, but entirely irrational and absurd.

That the words in the beginning refer to the first creation, cannot be doubted, if it be remembered that Jehovah himself founds a claim to eternity on this very ground: before the day was, I am he. Before the mountains were brought forth, or ever thou hadst formed the earth or the world, even from everlasting to everlasting, thou art God. Isa. xlvii. 13. Pf. ix. 2. See also Prov. viii. 23, 24. &c. Now there could be no propriety in this kind of reasoning, if angels or any other creature existed before the creation of the world, because all claims to eternity from such premises would apply even to Gabriel as well as to Jehovah, before the world was, is, in Scripture language, a phrase always expressive of eternity; and on this principle the evangelist John afferts the pre-existence of Jesus Christ in the first chapter of his history. For this purpose he alludes to the words of Moses, and introduces his divine nature to notice by celebrating the first act of his creative power. In the beginning (says he) was the Word; that is, Dr Doddridge remarks, before the foundation of the world, or the first production of any creature; and Dr Sherlock is clear of all opposition, that the words, in their most common and usual acceptation, signify the first creation of all things, and are a demonstration of the divinity of Christ. Of the same mind was Dr Owen. He says, that if the phrase beginning does not absolutely and formally express eternity, yet it doth a pre-existence to the whole creation, which amounts to the same thing; for nothing can pre-exist before all creatures but the nature of God, which is eternal, unless we suppose a creature before the creation of any. But what is meant by this expression is fully declared by other passages of Scripture: I was set up from everlasting, before the beginning, or even the earth was: Glorify thou me with thine own self, with the glory which I had with thee before the world was; both which passages not only explain the text, but undeniable prove the pre-existence of Christ the son of God. It should be remembered, that, in the passage under consideration, the Evangelist's argument for the divinity of Jesus Christ is grounded on his pre-existing the creation of the world; and it is consequently afferted, that he is the creator of all things; but if angels had a being before the period to which he alludes, the argument loses all its force, and no more proves the divinity of Christ than the divinity of an angel (A).

If, therefore, the words of Moses be impartially viewed in their obvious natural meaning, and compared with other passages of Scripture that relate to the same subject, we have no doubt, but every unprejudiced mind will perceive, that as he intended to give a summary history of the creation of all things both in heaven and in earth, he has done it in language intelligible and accurate, and in terms sufficiently explicit.

As to the nature of these beings, we are told, that their nature, power, employment, &c. have been a controversy of long standing. Not only the ancient philosophers, but some of the Christian fathers were of opinion, that angels were cloathed with ethereal, or fiery, bodies, of the same nature with those which we shall one day have when we come to be equal to them. But the more general opinion especially of later times, has been, that they are substances entirely spiritual, though they can at any time assume bodies, and appear in human or other shapes.

That the angelical powers and abilities vastly exceed those of man, cannot be denied, if we consider, that their faculties are not clogged or impeded, as ours are, by any of those imperfections which are inseparable from corporeal being; so that their understandings are always in perfect vigour; the inclinations regular; their motions strong and quick; their actions irreducible by material bodies; whose natural qualities they can control, or manage to their purposes, and occasion either blessings or calamities, public or private, here below; Influences of which are too numerous to mention.

Besides their attendance on God, and their waiting and executing of his commands, they are also presumed to be employed in taking care of mankind and their concerns: and that every man had such a tutelar or guardian angel, even from his birth, was a firm belief and tradition among the Jews; and our Saviour himself seems to have been of the same sentiment. The heathens were all of the same persuasion, and thought it a crime to neglect the admonitions of so divine a guide. Socrates publicly confessed himself to be under the direction of such an angel, or daemon, as several others have since been. And in this tutelar genius of each person they believed his happiness and fortune depended. Every genius did his best for the interest of his client; and if a man came by the world, it was a sign the strength of his genius was inferior to that.

(A) Of this Socinus and his followers were aware; and therefore artfully endeavoured to evade the force of the apostle's reasoning, by interpreting the phrase in the beginning either in a figurative sense, or as referring to the beginning of John the Baptist's ministry. We will only subjoin, that we do not remember to have seen any writer deviate from the primary obvious meaning of the passage, who had not some hypotheses to support imaginary to truth.
that of his opponent, that is, of an inferior order; and this was governed by chance. There were some genii, whose ascendency was so great over others, that their very presence entirely disconcerted them; which was the case of that of Augustus in respect to that of Marc Antony: and for the same reason, perhaps, some persons have wit, and speak well, when others are absent, in whose presence they are confounded, and out of countenance. The Romans thought the tutilar genii of those who attained the empire, to be of an eminent order; on which account they had great honours shown them. Nations and cities also had their several genii. The ancient Persians so firmly believed the ministry of angels, and their superintendence over human affairs, that they gave their names to their months, and the days of their month; and assigned them different offices and provinces: and it is from them the Jews confefs to have received their names of the months and angels, which they brought with them when they returned from the Babylonish captivity. After which, we find, they also assigned charges to the angels, and in particular the patronage of empires and nations; Michael being the prince of the Jews, as Raphael is supposed to have been of the Persians.

The Mahometans have so great a respect for the angels, that they account a man an infidel who either denies their existence, or loves them not. They believe them to be free from sin, enjoying the preference of God, to whom there are never disobedient: and they have sublime pure bodies, being created of light; and have no distinction of sexes, nor do they need the refreshment of food or sleep. They suppose them to have different forms and offices: that some adore God in several poffures; others sing his praises, and intercede for men: some carry and encompass his throne; others write the actions of men, and are assigned guardians of them.

As the number of these celestial spirits is very great, it is likewise reasonable to believe that there are several orders and degrees among them; which is also confirmed by Scripture; whence some speculative men have distributed them into nine orders, according to the different names by which they are there called; and reduced those orders into three hierarchies, as they call them: to the first of which belong seraphim, cherubim, and thrones; to the second, dominions, virtues, and powers; and to the third, principalities, archangels, and angels. They imagine further, that there are some who constantly reside in heaven; others who are ministers, and went forth, as there is occasion, to execute the orders they receive from God by the former. The Jews reckon but four orders or companies of angels, each headed by an arch-angel; the first order being that of Michael, the second of Gabriel, the third of Uriel, and the fourth of Raphael: but though the Jews believe them to be four, yet it seems there were rather seven. The Persians also held, there were subordinate degrees among the angels.

Although the angels were originally created perfect, of the good, and obedient to their master's will, yet some of them sinned, and kept not their first estate, but left their habitation; and of the most blessed and glorious became the most vile and miserable of all God's creatures. They were expelled the regions of light, and cast down to hell, to be reserved in everlasting chains under darkness, until the day of judgment. With heaven they lost their heavenly disposition, which delighted once in doing good and praising God; and fell into a fettled rancour against him, and malice against men: their inward peace was gone; all desire of doing good departed from them; and, instead thereof, revengeful thoughts and despair took possession of them, and created an eternal hell within them.

When, and for what offence, these apostate spirits fell from heaven and plunged themselves into such an abyss of wickedness and wo, are questions very hard, if not impossible, to be determined by any clear evidence of Scripture. As to the time, we are certain that it could not be before the sixth day of creation; because on that day it is said, "God saw every thing that he had made, and beheld it was very good:" but that it was not long after is very probable, as it must have preceded the fall of our first parents. Some have imagined it to have been after; and that carnality, or lusting to converse with women upon earth, was the sin which ruined them: an opinion (a) built on a mistaken interpretation of Scripture, as if angels were meant by the sons of God who are said to have begotten the mighty men of old on the daughters of men. Others have supposed, that the angels, being informed of God's intention to create man after his own image, and to dignify his nature by Christ's assuming of it, and thinking their glory to be eclipsed thereby, envied man's happiness, and so reviled: and with this opinion that of the Mahometans has some affinity: who are taught, that the devil, who was once one of those angels who are nearest God's preference, and named Azazel, forfeited paradise for refusing to pay homage to Adam at the command of God. But on what occasion ever he first showed it, pride seems to have been the leading sin of the angels; who, admiring and valuing themselves too much on the excellence of their nature and the height of their station, came at length to entertain so little respect for their Creator.

(a) This opinion seems to have been originally occasioned by some copies of the Septuagint, which, in the days of St. Athan, had in this place the angels of God. Laconatus supposes the angels, who were guilty of this enormity, had been sent down by God to guard and take care of mankind; and being ended with free-will, were charged by him not to forfeit the dignity of their celestial nature, by defiling themselves with the corruptions of the earth; but that the devil at length enticed them to debauch themselves by women. He adds, that, being not admitted into heaven by reason of the wickedness into which they had plunged themselves, they fell down to the earth, and became the devil's ministers; but that those that were begotten by them, being neither angels nor men, but of a middle nature, were not received into hell, no more than their parents were into heaven. Hence arose two kinds of daemons, celestial and terrestrial. These are unclean spirits, the authors of whatever evils are committed, and whose prince is the devil. From hence very probably proceeded the notion of Incubi, or daemons who are supposed to have carnal knowledge of women.
ANGEL

Creator, as to be guilty of downright rebellion and apostacy. It is certain from Scripture, that the fallen angels were in great numbers, and that there were also some order and subordination preferred among them; one especially being considered as their prince, and called by several names, Beelzebub, Satan, or Samael by the Jews; Adrammelech, by the Persians; and Eblis, by the Mahometans. Their constant employment is, not only doing evil themselves, but endeavouring by all arts and means to seduce and pervert mankind, by tempting them to all kind of sin, and thereby bringing them into the same desperate state with themselves.

Angel is likewise a title given to bishops of several churches. In this sense is St Paul undercropped by some authors, where he says, Women ought to be covered in the church, because of the angels. The learned Dr Prideaux observes, that the minister of the synagogue, who officiated in offering up the public prayers, being the mouth of the congregation, delegated by them as their representative, messenger, or angel, to speak to God in prayer for them, was therefore, in the Hebrew language, called the angel of the church; and from thence the bishops of the seven churches of Asia are, by a name borrowed from the synagogue, called the angels of the seven churches.

Angel, in commerce, the name of a gold coin formerly current in England. It had its name from the figure of an angel represented upon it, weighed four pennyweights, and was twenty-three and a half carats fine. It had different values in different reigns; but is at present only an imaginary sum, or money of account, implying ten shillings.

ANGEL-FISH, in ichthyology, a species of Squalus. See SQUALUS.

ANGELIC, or Angelical, something belonging to, or that partakes of the nature of angels. We say an angelical life, &c. St Thomas is styled the angelical doctor. The angelical fatuation is called by the Romanists Ave Maria; sometimes simply angelus.

ANGELICA (Angelica officinalis), in ancient times, was a monkish garment, which laymen put on a little before their death, that they might have the benefit of the prayers of the monks. It was from them called angelical, because they were called angels who by those prayers anima faltitiusfucurrentant. Hence, where we read the phrase monachus ad jecundandum in old books, it must be understood of one who had put on the habit when he was at the point of death.

ANGELICA: A genus of the digynia class of plants, and in the natural method ranking under the 4th order Umbelatae. The essential characters are: The fruit is roundish, angled, solid, with reflected style; the corolla are equal, and the petals incurvated.

Species. 1. The fativa, or common angelica, which is cultivated in gardens for medicinal use, and likewise for a sweetmeat, grows naturally in the northern countries. The root of this species is brown, oblong, and an inch or two thick, fragrant, and acrid. The leaves are very large, composed of pinnated folia, of an oblong oval figure, dentated at the edge, and the odd leaf at the end of the pinna lobated; the stalk is round, fristated, and as thick as a child's arm. The umbels are very large, and of a globific figure; the flowers very small and greenish.

ANGELICA is a native of Hungary and Germany. The leaves are much larger than those of the former, and the flowers are yellow. 3. The sylvætris grows naturally in moist meadows, and by the fides of rivers, in many parts of Britain; it is seldom admitted into gardens. 4. The †atro-purpurea canadensis: 5. The lucida canadensis: These are natives of North America, but have neither beauty nor use.

Culture. The common angelica delights to grow in a moist soil: the seeds should be sown soon after they are ripe. When the plants come up about six inches high they should be transplanted very wide, as their leaves spread greatly. If they are planted on the fides of ditches or pools of water, about three feet distance, they will thrive exceedingly.

Medicinal Uses. For the purposes of medicine, Bohemia and Spain produces the best kinds of angelica. The London college direct the roots brought from Spain to be alone made use of. Angelica roots are apt to grow moulidly, and to be preyed upon by insects, unless thoroughly dried, kept in a dry place, and frequently aired. It is probable that the roots which are subject to this inconvenience might be preferred, baking them in boiling spirit, or exposing them to its steam after they are dried.

All the parts of angelica, especially the root, have a fragrant aromatic smell, and a pleasant bitterish warm taste, glowing upon the lips and palate for a long time after they have been chewed. The flavour of the seeds and leaves is very pernicious, particularly that of the latter, which, on being barely dried, lose the greatest part of their taste and smell: the roots are more tenacious of their flavour, though even these lose part of it upon keeping. The fresh root, wounded early in the spring, yields an odorous yellow juice, which slowly exuded, proves an elegant gummy resin, very rich in the virtues of the angelica. On drying the root, this juice concretes into distinct yellowish, which, on cutting it longitudinally, appear distributed in little veins: in this state, they are extracted by pure spirit, but not by watery liquors.

Angelica is one of the most elegant aromatics of European growth, though little regarded in the present practice. The root, which is the most efficacious part, is used in the aromatic tincture: and the stalks make an agreeable sweetmeat.

ANGELICS (Angelici), in church history, an ancient sect of heretics, supputed by some to have got this appellation from their excessive veneration of angels; and by others from their maintaining that the world was created by angels.

ANGELICS is also the name of an order of knights, instituted in 1191, by Angleus Flavius Commenius, emperor of Constantinople.

ANGELICS is also a congregation of nuns, founded at Milan in 1534, by Louisa Tocelli, countess of Guatalla. They observe the rule of St Augustine.

ANGELITES, in ecclesiastical history, a sect of Christian heretics, in the reign of the emperor Anatha- tius, and the pontificate of Symmachus, about the year 494, so called from Angeliam, a place in the city of Alexandria, where they held their first meetings. They were called likewise Soterites, from one Severus, who was the head of their sect; as also Theodotus, from
one among them named Theodosius, whom they made pope at Alexandria. They held, that the persons of the Trinity are not the same; that none of them exists of himself, and of his own nature; but that there is a common god or deity existing in them all, and that each is God, by a participation of this deity.

ANGELO (Michael). There were five celebrated Italian painters of his name, who flourished in the 16th and 17th centuries; but the two most distinguished of them are these.—First, Michael Angelo Buonarroti, who was a most incomparable painter, sculptor, and architect, born in 1474, in the territory of Arezzi in Tuscany. He was the disciple of Dominico Ghirlandajo; and erected an academy of painting and sculpture in Florence, under the protection of Lorenzo di Medici; which, upon the troubles of that house, was obliged to remove to Bologna. About this time he made an image of Cupid, which he carried to Rome, broke off one of its arms, and buried the image by him. It was accordingly found, and sold to Cardinal St. Gregory for an antique; until Michael, to their confusion and his own credit, discovered his artifice, and confirmed it by the deficient arm which he produced: it is rather unuseful for the manufacturers of antiques to be so ingenious. His reputation was so great at Rome, that he was employed by pope Sixtus V. to build his chapel; and by the command of Pope Paul III. executed his most celebrated piece The left judgment. He has the character of being the greatest designer that ever lived; and it is universally allowed that no painter ever understood anatomy so well. He died immemorially rich at Rome, in 1564.—Secondly, Michael Angelo de Caravaggio, born at that village in Milan, in 1569. He was at first no more than a bricklayer's labourer: but he was so charmed with seeing some painters at work, that he immediately applied himself to the art; and made such a progress in a few years, that he was admired as the author of a new style in painting. He was observed of Michael Angelo Buonarroti, that he was incomparable in designing, but knew little of colouring; and by Caravaggio an excellent colourer was brought up. His colouring is either delicate or simulated, like a heart. There is one picture of his in the Dominican church at Antwerp, which Rubens used to call his master. It is said of this painter, that he was so strangely contentious, that the pencil was no sooner out of his hand but his sword was in it. He died in 1609.

ANGELO (St.) a small but strong town of Italy, in the Capitanata. There are several other towns and castles of the same name in Italy, and particularly the castle of St. Angelo at Rome. E. Long. 15. 56. N. Lat. 41. 45.

ANGELOS (103), a province of Mexico, the ancient republic of Tlaica, of which a city called Tlaica was once the capital. That city is now reduced to an inaccessible village, and has given place to another called Puebla de los Angeles, or the city of Angels. It is situated in W. Long. 103. 12 and N. Lat. 19. 13. It was formerly an Indian town; but in 1530 was entirely abandoned by the natives, on account of the cruelties of the Spaniards. A succeeding viceroy of Mexico, by a milder treatment, recalled them; and the town is now exceedingly rich and populous, as even to vie with Mexico itself in magnificence. It is situated on the river Zacatula, in a fine valley, about 25 leagues to the eastward of Mexico. In the middle is a beautiful and spacious square, from whence run the principal streets in direct lines, which are crossed by others at right angles. One side is almost entirely occupied by the magnificent front of the cathedral; while the other three consist of piazzas, under which are the shops of tradesmen. The city is the see of a bishop, suffragan to the archbishop of Mexico, and we may form a judgment of the wealth of the place by the revenue of the cathedral and chapter, which amounts to 300,000 pieces of eight annually. It must be remembered, however, that in all populous countries the wealth of the laity by no means bears a due proportion to that of the clergy. What contributes greatly to increase the riches of this province is, that here is situated the city of Vera Cruz, the natural centre of all the American treasures belonging to Spain. See Vera Cruz.

ANGELOT, an ancient English gold coin, struck at Paris, while under subjection to the English. It was thus called from the figure of an angel supporting the escutcheon of the arms of England and France. There was another coin of the same denomination struck under Philip de Valois.

ANGELOT is also used in commerce to denote a small flat rich fort of chese brought from Normandy. Skinner supposes it to have been thus called from the name of the person who first made up in that form, and perhaps stamped it with his own name. Menage takes it to have been denominated from the resemblance it bears to the English coin called angelot. It is made chiefly in the Pays de Bray, whence it is also denominated angelot de Bray. It is commonly made in vats, either square or shaped like a heart.

ANGER, a violent passion of the mind, consisting in a propensity to take vengeance on the author of some real or supposed injury done to the offended party.

Anger is either deliberative or ininitivé; and the latter kind is rash and ungovernable, because it operates blindly, without affording time for deliberation or forethought. Bishop Butler was well understood when he said, 'anger is far from being a selfish passion, for it is naturally excited by injuries offered to others as well as to ourselves; and was designed by the Author of nature not only to excite us to act vigorously in defending ourselves from evil, but to interest us in the defence or rescue of the injured and helpless, and to raise us above the fear of the proud and mighty oppressors.'

Neither, therefore, is all anger sinful: hence the precept, 'Be ye angry and sin not.'—It becomes sinful, however, and contradicts the rule of scripture, when it is conceived upon flight and Inadequate provocations, and when it continues long. It is then contrary to the amiable spirit of charity, which 'differs only in the world, and is not easily provoked.' Hence these other precepts, 'Let every man be slow to anger;' and, 'Let not the Sun go down upon your wrath.'

These precepts, and all reasoning indeed upon the subject, suppose the passion of anger to be within our power; and this power consists not so much in any faculty we have of appeasing our wrath at the time (for we are passive under the smart which an injury or affront occasions, and all we can then do is to prevent its breaking out into action), as in mollifying our minds
minds by habits of just reflection, as to be less irritated by impieties of injury, and to be sooner pacified.

As reflections proper for this purpose, and which may be called the sedatives of anger, the following are suggested by Archdeacon Paley in his excellent treatise of Moral and Political Philosophy*—"The possibility of mistaking the motives from which the conduct that offends us proceeded; how often our offences have been the effect of inadvertence; when they were mistaken for malice; the inducement which prompted our adversary to set as he did, and how powerfully the same inducement has, at one time or other, operated upon ourselves; that he is suffering perhaps under a contrition, which he is ashamed, or wants opportunity, to confess; and how ungenerous it is to triumph by coldness or insult over a spirit already humbled in secret; that the returns of kindness are sweet, and that there is neither honour, nor virtue, nor usefulness, in which on one account or other, has sometimes betrayed us; the inducement which prompted our passions, their prejudices, their favorite aims, their fears, their cautiousness, their interests, their sudden impulses, their varieties of apprehension, as well as we: we may recollect what hath sometimes passed in our own minds, when we have got on the wrong side of a quarrel, and imagine the fame to be passing in our adversary’s mind now; when we became sensible of our misbehaviour, what palliations we perceived in it, and expected others to perceive; how we were affected by the kindness, and felt the superiority of a generous reception and ready forgiveness: how perseverance revived our spirits with our enmity, and seemed to justify the conduct in ourselves which we before blamed. Add to this, the indecency of extravagant anger; how it renders us, whilst it lafts, the scorn and sport of all about us, of which it leaves us, when it ceases, sensible and ashamed; the inconveniences and irretrievable misconduct into which our irascibility has sometimes betrayed us: the friendships it has lost us; the difficulties and embarrassments in which we have been involved by it, and the fore repentance which on one account or other it always costs us.

But the reflection calculated above all others to allay that haughtiness of temper which is ever finding out provocation, and which renders anger so impetuou s, is that which the gospel propone s; namely, that we ourselves are, or shortly shall be, suppliants for mercy and pardon at the judgment-seat of God. Imagine our secret sins all disclosed and brought to light; imagine us thus humbled and exposed; trembling under the hand of God; calling ourselves on his compassion; crying out for mercy—imagine such a creature to talk of satisfaction and revenge, refusing to be interested, dishonoring to forgive, extreme to mark and to resent what is done amidst; imagine, I say, this; and you can hardly feign to yourself an instance of more impious an unnatural arrogance."

Physicians and naturalists afford instances of very extraordinary effects of this passion. Borrichius cured a woman of an inveterate tertian ague, which had baffled the art of physic, by putting the patient in a furious fit of anger. Valeriana made use of the same means, with the like success, in a quartan ague. The same passion has been equally salutary to paralytic, gouty, and even dumb persons; to which last it has sometimes given the use of speech. Etculmer gives divers instances of very singular cures wrought by anger; among others, he mentions a person laid up in the gout, who, being provoked by his physician, flew upon him, and was cured. It is true, the remedy is somewhat dangerous in the application, when a patient does not know how to use it with moderation. We meet with several instances of princes to whom it has proved mortal; e. g. Valentinian the first, Wenceslaus, Matthias, Corvinus king of Hungary, and others. There are also instances wherein it has produced the epilepsy, jaundice, cholera morbus, diarrhœa, &c. In fact, this passion is of such a nature, that it quickly throws the whole nervous system into preternatural commotions, by a violent stricture of the nervous and muscular parts; and surpris- ingly augments not only the systole of the heart and of its contiguous vesicles, but also the tone of the fibrous parts in the whole body. It is also certain, that this passion, by the spasmotic stricture it produces in the parts, exerts its power principally on the stomoch and intestines, which are highly nervous and membranous parts; whence the symptoms are more dangerous, in proportion to the greater content of the stomoch and intestines with the other nervous parts, and almost with the whole body.—The unhappy influence of anger likewise, on the biliary and hepatic ducts, is very surprising; since, by an intense conftriction of these, the liver is not only rendered stierrous, but stones also are often generated in the gall-bladder and biliary ducts: these accidents have scarce any other origin than an obstruction of the free motion and efflux of the bile, by means of this violent stricture. From such a stricture of these ducts likewise proceeds the jaundice, which in process of time lays a foundation for calculous concretions in the gall-bladder. Lastly, by increasing the motion of the fluid, or the spasms of the fibrous parts, by means of anger, a larger quantity of blood is propelled with an impetus to certain parts; whence it happens that they are too much distended, and the orifices of the veins distributed there opened. It is evident from experience, that anger has a great tendency to excite enormous hemorrhagies, either from the nose, the aperture of the pulmonary artery, the veins of the anus; or in women, from the uterus, especially in those previously accustomed and disposed to such evacuations.

END OF THE FIRST VOLUME.
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